The Role of the No-Harm Rule in Governing Solar Radiation Management Geoengineering

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Contents

Thesis abstract

Scientists propose developing solar radiation management (SRM) geoengineering to offset rising global mean surface temperatures associated with anthropogenic climate change. The most prominent proposal is stratospheric aerosol injection (SAI). SAI involves creating aerosol particles in the stratosphere to reflect some incoming solar radiation and thereby reduce global temperature increase. SAI poses risks of transboundary harm and/or harm to the atmosphere, such as regional drought and further depletion of the stratospheric ozone layer. It is therefore important that SAI is governed at an international level. However, presently there are no international agreements that specifically govern SAI, or SRM more generally.

This thesis asks what role the 'no-harm' rule might play in the international governance of SAI. The no-harm rule is a longstanding principle of customary international law. It provides that states have an obligation to prevent significant transboundary harm and harm to the global commons. Legal scholarship has considered the potential of the no-harm rule as a basis of a claim for state responsibility should a state attempt SAI and cause significant transboundary harm. However, there has been no detailed consideration of the potential of the no-harm rule to respond prospectively to the risks of transboundary harm and/or harm to the atmosphere posed by SAI.

This thesis examines the content of the no-harm rule and considers its likely influence on the behaviour of states in future attempts at SAI. Using doctrinal legal analysis, this thesis establishes that states have a duty to take positive action to prevent activities under their jurisdiction and control from causing significant transboundary harm and/or harm to the global commons. This includes conducting an environmental impact assessment and notifying and consulting with potentially affected states. In the context of SAI, states may also be held strictly responsible should significant harm nevertheless result. However, the meaning of 'significant' harm is ambiguous, and it is unclear how this should be interpreted to determine when SAI will give rise to obligations under the no-harm rule. This thesis applies Brunnée and Toope's theory of interactional international law to analyse the no-harm rule's capacity to promote compliance through as sense of legal obligation and legitimacy. This capacity appears strongest regarding the prevention of transboundary harm and weakest for the prevention of harm to the global commons.

Given the risks of harm to the atmosphere posed by SAI, it should be a priority for the international community to develop the no-harm rule for application to global commons areas. This thesis recommends developing a set of objective criteria to reduce doctrinal ambiguity for determining if a proposed activity poses a risk of significant harm to the global commons. It also recommends creating greater opportunities for mutual engagement between state and non-state actors to enhance shared understandings and practices to strengthen the likelihood of compliance with the no-harm rule in this context. The results of this thesis provide a deeper understanding of the capacity of the no-harm rule to respond to the risks of SAI and how it might be developed to better contribute to international environmental governance.

Statement of Candidate

DECLARATION OF ORIGINALITY

This thesis contains no material which has been accepted for a degree or diploma by the University or any other institution, except by way of background information and duly acknowledged in the thesis, and to the best of my knowledge and belief no material previously published or written by another person except where due acknowledgement is made in the text of the thesis, nor does the thesis contain any material that infringes copyright.

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29th November 2016

STATEMENT OF CO-AUTHORSHIP

This thesis adopts the traditional thesis format. However, chapters one, two and three draw on articles that were published by the candidate and supervisors during the course of candidature.

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Kerryn Brent, Jeffrey McGee, and Jan McDonald, 'The Governance of Geoengineering: An emerging Challenge for International and Domestic Legal Systems?' (2015/2016) 24(1) *Journal of Law, Information and Science* 1:

Drawn on in chapter one

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Drawn on in chapters two and three.

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Preface

I first came across the issue of geoengineering in 2012, when I was looking for a thesis topic in international environmental law. Geoengineering was making headlines in the news. A controversial field experiment for stratospheric aerosol injection had been scheduled to take place in United Kingdom, but was cancelled largely due to patent conflicts. In that same year, an illegal ocean fertilization experiment was conducted off the coast of British Colombia, Canada. I was shocked by the sheer hubris of the idea that humans might deliberately manipulate the global climate, and by claims that the global community may not have a choice if it wishes to avoid severe climate change impacts. Moreover, I was deeply concerned by claims in popular media and academic literature that there were no rules of international law to prohibit geoengineering.

I began this thesis with a broad focus on international law for the governance of geoengineering. This led me to consider the no-harm rule. It quickly became apparent that there were no easy answers or explanations of the content of the no-harm rule, or the role it plays in contemporary international environmental governance. Geoengineering therefore provided a novel lens through which to reconsider the no-harm rule.

The timing of this thesis has been fortuitous. Over the past four years, there has been a surge in interest in geoengineering and its potential to contribute to international efforts to combat climate change. There has also been a reawakening of interest in the no-harm rule in international law scholarship as a mechanism to enable international law to respond to complex threats of global environmental harm. It has been a wonderful experience to work on two cutting-edge topics.

Throughout the course of my research, I have come to understand and appreciate that the future welfare of the global community may depend on some form of geoengineering going ahead to prevent excessive global temperature rise. But I firmly believe that international legal and governance mechanisms much first be in place to ensure that any attempts at geoengineering do not do more harm than good. I look forward to continuing to work towards the international governance of SRM.

Commonly used Acronyms and Abbreviations

ASEAN	Association of Southeast Asian Nations
CBD	Convention on Biological Diversity
CDR	Carbon Dioxide Removal
COP	Conference of the Parties
EIA	Environmental Impact Assessment
ENMOD	Convention on the Prohibition of Military or Other Hostile Use of Environmental Modification Techniques
ESPOO	Convention on Environmental Impact Assessment in a Transboundary Context
EuTRACE	European Transdisciplinary Assessment of Climate Engineering
GHG	Greenhouse Gas
ICJ	International Court of Justice
ILC	International Law Commission
IPCC	Intergovernmental Panel on Climate Change
IR	International Relations
ITLOS	International Tribunal for the Law of the Sea
LRTAP	Convention on Long Range Transboundary Air Pollution
OIF	Ocean Iron Fertilisation
SAI	Stratospheric Aerosol Injection
SRM	Solar Radiation Management
SRMGI	Solar Radiation Management Governance Initiative
UNCLOS	United Nations Convention on the Law of the Sea
UNFCCC	United Nations Framework Convention on Climate Change

Key International Agreements and Declarations

(By alphabetic order)

1996 Protocol to the 1972 Convention on the Prevention of Marine Pollution by Dumping of Wastes and Other Matter, opened for signature 7 November 1996, [2006] ATS 11 (entered into force 24 March 2006)

The Antarctic Treaty, opened for signature 1 December 1959, 402 UNTS 72 (entered into force 23 June 1961)

ASEAN Agreement on Transboundary Haze Pollution, opened for signature 10 June 2002 (entered into force 25 November 2003) available at <http://haze.asean.org/asean-agreement-on-transboundary-haze-pollution/>

Declaration of the United Nations Conference on the Human Environment, UN Doc.A/CONF/48/14/REV.1 (16 June 1972)

Declaration of the United Nations Conference on Environment and Development, UN Doc.A/CONF.151/26/Rev.1(3-14 June 1992)

Convention on Biological Diversity, opened for signature 5 June 1992, 1760 UNTS 79 (entered into force 29 December 1993)

Convention on International Civil Aviation, opened for signature 7 December 1944 (entered into force 4 April 1947)

Convention on Long-range Transboundary Air Pollution, opened for signature 13 November 1979, 1302 UNTA 217 (entered into force 16 March 1983)

Convention on the Prevention of Marine Pollution by Dumping of Wastes and Other Matter, opened for signature 29 December 1972, 1046 UNTS 138 (entered into force 30 August 1975)

Convention on the Prohibition of Military or Other Hostile Use of Environmental Modification Techniques, opened for signature 10 December 1976, 1108 UNTS 151 (entered into force 5 October 1978)

Convention on Environmental Impact Assessment in a Transboundary Context, opened for signature 25 February 1991, 1989 UNTS 309 (entered into force 10 September 1997)

Convention on Wetlands of International Importance, opened for signature 2 February 1971, 996 UNTS 246 (entered into force 21 December 1975)

Montreal Protocol on substances that Deplete the Ozone Layer, opened for signature 16 September 1987, [1989] ATS 18 (entered into force 1 January 1989)

Paris Agreement, opened for signature 12 December 2016 (entered into force 4 November 2016) < http://unfccc.int/paris_agreement/items/9485.php>

Protocol on Environmental Protection to the Antarctic Treaty, opened for signature 4 October 1991, [1998] ATS 6 (entered into force 14 January 1998)

Treaty Banning Nuclear Weapons Tests in the Atmosphere, in Outer Space and Under Water, opened for signature 5 August 1953, 480 UNTS 45 (entered into force 10 October 1963)

United Nations Convention on the Law of the Sea, opened for signature 10 December 1982, 1833 UNTS 3 (entered into force 16 November 1994)

United Nations Framework Convention on Climate Change, opened for signature 9 May 1992, 1771 UNTS 107 (Entered into force 21 March 1994)

Vienna Convention for the Protection of the Ozone Layer, opened for signature 22 March 1985, 1513 UNTS 293 (entered into force 22 September 1988)

Key Decisions by International Courts and Tribunals

(By year)

1920 *Island of Palmas (Netherlands v United States)(Awards)* [1928] 2 RIAA 829

1940 *Trail Smelter (United States v Canada) (Awards)* (1938 and1941) 3 RIAA 1905

Corfu Channel Case (United Kingdom v Albania) (Merits) [1949] ICJ Rep 4

1950 *Lake Lanoux Arbitration (France v Spain)* (1957) 24 ILR 101

1960 *North Sea Continental Shelf (Federal Republic of Germany v Denmark; Federal Republic of German v Netherlands)* [1969] ICJ Rep 3

1970 *Case Concerning the Barcelona Traction, Light and Power Company, Limited (Second Phase) (Belgium v Spain) (Judgment)* [1970] ICJ Rep 3

Nuclear Tests Case (Australia v France) (Judgment) [1974] ICJ Reports 253

Nuclear Tests Case (New Zealand v France) (Judgment) [1974] ICJ Reports 457

1990 *Legality of the Threat or Use of Nuclear Weapons (Advisory Opinion)* [1996] ICJ Rep 226

Gabčíkovo-Nagymaros Project (Hungary v Slovakia) (Judgment) [1997] ICJ Rep 7

2010 *Pulp Mills on the River Uruguay (Argentina v Uruguay) (Judgment)* [2010] ICJ Rep 14

Responsibilities and Obligations of States Sponsoring Persons and Entities with Respect to Activities in the Area (Advisory Opinion), (2011) ITLOS Reports 10

Aerial Herbicide Spraying (Ecuador v Colombia) (Order of 13 September 2013) [2013] ICJ Rep 278

Certain Activities Carried Out by Nicaragua in the Boarder Area (Costa Rica v Nicaragua) & Construction of a Road in Costa Rica Along the San Juan River (Nicaragua v Costa Rica) (Judgment) (International Court of Justice, General List No 150 & 152, 16 December 2015)

The South China Sea Arbitration (Philippines v China) (Awards) (Permanent Court of Arbitration, Case No 2013-19, 12 July 2016)

1 Introduction

Parts of this chapter are published in Kerryn Brent, Jeffrey McGee, and Jan McDonald, 'The Governance of Geoengineering: An emerging Challenge for International and Domestic Legal Systems?' (2015/2016) 24(1) *Journal of Law, Information and Science* 1. Permission has been granted from the editor to reproduce sections of this article in this chapter (See appendix 1).

The 'no-harm' rule[1] is a longstanding principle of customary international law.[2] The no-harm rule provides that states have a duty to prevent significant transboundary harm to the territory of other states, and harm to the global commons.[3] Since the no-harm rule was formally articulated in the *Trail Smelter* arbitration[4], it has been restated in two influential international

[1] Roda Verheyen, *Climate Change Damage and International Law: Prevention Duties and State Responsibility* (Koninklijke Brill NV, 2005), 137 & 145.

[2] Customary international law is unwritten international law that binds all states. Article 38 of *The Statute of the International Court of Justice* defines customary international law as 'international custom, as evidence of a general practice accepted as law'. Customary international law is formed by two elements. The first element is state practice; that is that states follow the custom. The second element is *opinio juris sive necessitatis* or a belief that the custom is law and must therefore be followed. For an explanation of customary international law see Donald K Anton, Penelope Mathew and Wayne Morgan, *International Law- Cases and Materials* (Oxford University Press, 2005) 202; Ian Brownlie, *Principles of Public International Law* (Oxford University Press, 7th ed, 2008) 5-10. Alexandre Kiss and Dinah Shelton, *International Environmental Law* (Transnational Publishers, Inc. , 3rd ed, 2004), 175. Kiss and Shelton describe the role of customary rules in international environmental law as forming 'a kind of common law of the environment.'

[3] See *Trail Smelter Case (United States v Canada) (Awards)* (1938 and1941) 3 RIAA 1905, 1965 ('*Trail Smelter (Awards)*'); *Declaration of the United Nations Conference on the Human Environment*, UN Doc.A/CONF/48/14/REV.1 (16 June 1972) ('*Stockholm Declaration*') principle 21; Declaration of the United Nations Conference on Environment and Development, UN Doc.A/CONF.151/26/Rev.1(3-14 June 1992) ('*Rio Declaration*') principle 2; *Legality of the Threat or Use of Nuclear Weapons (Advisory Opinion)* [1996] ICJ Rep 226, 241-242 ('*Nuclear Weapons (Advisory Opinion)*'); Philippe Sands and Jacqueline Peel, *Principles of International Environmental Law* (Cambridge University Press, 3rd ed, 2012) 195-196. According to Sands and Peel, there is no question since the *Nuclear Weapons (Advisory Opinion)* that states have a duty under customary international law to prevent harm to the territory of other states and the global commons. The global commons are areas and resources that exist beyond the territorial jurisdiction of states and/or cannot be exclusively owned and controlled by states. The oldest global commons recognised by international law is the high seas. The global commons also include the deep seabed and outer space. See Kathy Leigh, 'Liability for Damage to the Global Commons' (1992) 14 *Australian Year Book of International Law* 129, 130 and Marvin S. Soroos, 'Preserving the Atmosphere as a Global Commons' (1998) 40(2) *Environment: Science and Policy for Sustainable Development* 6, 6. This project recognises that Antarctica is technically not a global commons as it is still subject to state sovereignty claims. These claims have been 'frozen' by *The Antarctic Treaty*, opened for signature 1 December 1959, 402 UNTS 72 (entered into force 23 June 1961) art IV. Antarctica is nonetheless commonly referred to as a global commons in international law literature and this project follows this trend. See Sands and Peel, above n 3, 579 nn 10.

[4] *Trail Smelter (Awards)* (1938 and1941) 3 RIAA 1905, 1965. The *Trail Smelter* arbitration concerned a bilateral dispute between the United States and Canada. The Tribunal reached its decision by applying principles of international law and US domestic law. This is further discussed in chapter 4.2.

soft law'[5] agreements: the 1972 *Stockholm Declaration*[6] and the 1992 *Rio Declaration*[7]. The no-harm rule has also been incorporated into binding international agreements[8], and it has been recognised by the International Court of Justice ('ICJ').[9] It is therefore well-recognised as a binding rule of customary international law.

As a principle of customary international law, the no-harm rule has the potential to 'fill the gaps' between international environmental agreements. Many environmental issues of international concern, such as transboundary air pollution and ozone depletion, are now governed by specific international agreements.[10] However, the scope of international agreements to respond to global environmental issues is not comprehensive. For example, key international environmental agreements, such as the 1982 *United Nations Convention on the Law of the Sea* ('*UNCLOS'*) and the 1979 *Convention on Long-Range Transboundary Air Pollution* ('*LRTAP'*) do not bind all states.[11] Furthermore, new threats of environmental harm may arise that are not specifically addressed by existing international agreements. The no-harm rule is binding on all states, and provides states with general obligations and sets a general standard for states to prevent activities under their jurisdiction and control from causing significant harm to the environment of other states and to the areas beyond their jurisdiction

[5] 'Soft law' agreements are non-binding agreements in international law. However, they may provide influential statements of existing customary law norms, and they can lead to the development of new customary norms. See Sands and Peel, above n 3, 108; Pierre-Marie Dupuy, 'Soft Law and the International Law of the Environment ' (1990-1992) 12 *Michigan Journal of International Law* 420, 422. Dupuy highlights that soft law has been important in the development of international environmental law, as many principles of international environmental law have evolved from soft-law agreements.

[6] *Stockholm Declaration*, principle 21.

[7] *Rio Declaration*, principle 2.

[8] See, eg, *Convention on the Prevention of Marine Pollution by Dumping of Wastes and Other Matter*, opened for signature 29 December 1972, 1046 UNTS 138 (entered into force 30 August 1975) preamble ('*London Convention*'); *Convention on Biological Diversity*, opened for signature 5 June 1992, 1760 UNTS 79 (entered into force 29 December 1993) art 3 ('*CBD*'); *United Nations Framework Convention on Climate Change*, opened for signature 9 May 1992, 1771 UNTS 107 (Entered into force 21 March 1994) preamble ('*UNFCCC*'); *Convention on Long-range Transboundary Air Pollution*, opened for signature 13 November 1979, 1302 UNTA 217 (entered into force 16 March 1983) preamble ('*LRTAP*'); *Vienna Convention for the Protection of the Ozone Layer*, opened for signature 22 March 1985, 1513 UNTS 293 (entered into force 22 September 1988) preamble ('*Ozone Convention*'); *United Nations Convention on the Law of the Sea*, opened for signature 10 December 1982, 1833 UNTS 3 (entered into force 16 November 1994) art 192-194(2) ('*UNCLOS'*).

[9] *Nuclear Weapons (Advisory Opinion)* [1996] ICJ Rep 226, 241 – 242. This obligation was repeated by the ICJ in the *Case Concerning the Gabçikovo-Nagymaros Project (Hungary v Slovakia)* (Merits) [1997] ICJ Rep 7, 41 ('*Gabçikovo-Nagymaros Project')*.

[10] For example, the problem of transboundary air pollution is addressed under the *LRTAP* Convention. Depletion of the stratospheric ozone layer is addressed by the *Ozone Convention* and the *Montreal Protocol on Substances that Deplete the Ozone Layer*, opened for signature 16 September 1987, [1989] ATS 18 (entered into force 1 January 1989) ('*Montreal Protocol*').

[11] There are only 168 parties to *UNCLOS*. Most notably, the United States is not a party. See *United Nations Convention on the Law of the Sea* (6 May 2017) United Nations Treaty Collection <https://treaties.un.org/Pages/ViewDetailsIII.aspx?src=TREATY&mtdsg_no=XXI-6&chapter=21&Temp=mtdsg3&clang=_en#1>. LRTAP is a regional convention. Membership is confined to European states with the exception of the US and Canada. See 1.2.4 below.

and control. The no-harm rule can form the basis of claims for state responsibility and reparations for harm caused to other states. It also provides states with a duty of conduct or 'due diligence' to take positive steps to prevent significant transboundary harm and harm to the global commons. This includes procedural obligations, such as the duty to conduct an environmental impact assessment (EIA) and the duty to notify and consult with potentially affected states. The no-harm rule therefore has the potential to enable international law to respond to activities that pose risks of transboundary harm or harm to the global commons that are not otherwise governed by international agreements.

One such future threat to the global environment is solar radiation management (SRM) geoengineering. Geoengineering is defined as 'the deliberate large-scale intervention in the Earth's climate system, in order to moderate global warming.'[12] SRM refers to a suite of geoengineering technologies currently being considered as a potential response to anthropogenic climate change. SRM is being proposed as a means to cool the global temperature by limiting the amount of sunlight (i.e. energy) that enters the earth's atmosphere.[13] The most prominent proposed method of SRM, stratospheric aerosol injection (SAI),[14] poses a significant risk of transboundary environmental harm and harm to the atmosphere *per se*. Scientists predict that harmful side-effects could include widespread drought, ozone depletion, and an increase to the earth's vulnerability to climate change.[15] The proposed development of SRM also presents political and social risks. For example, there is concern that if SRM were to be successfully developed, it could detract from current efforts and weaken political resolve to mitigate climate change by reducing global greenhouse gas emissions.[16]

Despite these risks, there are currently no international agreements that specifically govern SRM.[17] There is also currently no prospect that a binding international agreement for SRM is

[12] The Royal Society, 'Geoengineering the climate: science, governance and uncertainty ' (The Royal Society 2009) 1 ('*Royal Society Report*'). This definition is widely used in geoengineering literature.
[13] See ibid; Solar Radiation Management Governance Initiative, 'Solar radiation management: the governance of research ' (Solar Radiation Management Governance Initiative, 2011) <http://www.srmgi.org/report/> ('*SRMGI Report*').
[14] This term is used in S Schäfer et al, *The European Transdisciplinary Assessment of Climate Engineering (EuTRACE): Removing Greenhouse Gases from the Atmosphere and Reflecting Sunlight away from Earth* (2015) <http://www.eutrace.org/> 41('*EuTRACE Report*'). These proposals are also commonly referred to as sulphate aerosol injection.
[15] See, eg, Alan Robock, '20 reasons why geoengineering may be a bad idea' (2008) 64(2) *Bulletin of the Atomic Scientists* 14; *EuTRACE Report*, above n 14, 43-44; *Royal Society Report*, above n 12, 31.
[16] See, eg, *EuTRACE Report*, above n 14, 58-60.
[17] Efforts were made in the 1970's to ban environmental modification techniques, which are analogous to geoengineering, under the *Convention on the Prohibition of Military or Other Hostile Use of Environmental*

to be negotiated in the near future. This is alarming, given that there are proponents who advocate that SRM research should progress to field testing in the atmosphere in the near future.[18] Furthermore, the 2015 *Paris Agreement* on climate change has set an ambitious target of limiting global warming to 'well below 2°C' with the further intention of pursuing 'efforts to limit the temperature increase to 1.5°C'.[19] Leading climate change scientists and scholars have suggested that geoengineering might be necessary to achieve this target.[20] In this sense, the *Paris Agreement* has amplified calls to develop geoengineering technology, without providing a framework for future governance. The international governance of SRM is therefore a pressing issue for international law and governance scholars, scientists and policy-makers.[21]

This project examines the potential for the no-harm rule to contribute to the international governance of SRM. In this project, the term 'governance' is used to mean the 'process of steering or guiding societies towards collective outcomes that are socially desirable and away from those that are socially undesirable.'[22] This project recognises that governance can be achieved by formal (such as 'hard' or 'soft' international agreements) and informal (such as self-governance) mechanisms. However, due to the nature of proposed SRM and its potential to have global impacts and side effects, formal governance mechanisms will be necessary at an international level.[23]

Modification Techniques, opened for signature 10 December 1976, 1108 UNTS 151 (entered into force 5 October 1978) art 2 ('*ENMOD'*). For further discussion, see 1.2.1 below.

[18] Stefan Schafer et al, 'Field tests of solar climate engineering' (2013) 3(9) *Nature Clim. Change* 766. For examples of proposals to progress to field testing, see Douglas G. MacMynowski et al, 'Can we test geoengineering?' (2011) 4(12) *Energy & Environmental Science* 5044; Edward A Parson and David W Keith, 'End the Deadlock on Governance of Geoengineering Research' (2013) 339(6125) *Science* 1278; David G Victor et al, 'The Truth About Geoengineering' (2013) *Foreign Affairs* 1 <https://www.foreignaffairs.com/articles/global-commons/2013-03-27/truth-about-geoengineering>; Jane C S Long, Frank Loy and M Granger Morgan, 'Start research on climate engineering ' (2015) 518(7537) *Nature* 29.

[19] *Paris Agreement*, opened for signature 12 December 2016 (entered into force 4 November 2016) < http://unfccc.int/paris_agreement/items/9485.php>.

[20] See eg Kevin Anderson, 'Talks in the city of light generate more heat' 582 (7583) *Nature* 437; John Shepherd, 'What does the Paris Agreement mean for geoengineering?' on *The Royal Society* (17 Feb 2016) <http://blogs.royalsociety.org/in-verba/2016/02/17/what-does-the-paris-agreement-mean-for-geoengineering/>; Joshua B Horton, David W Keith and Matthias Honegger 'Implications of the Paris Agreement for Carbon Dioxide Removal and Solar Geoengineering' *Harvard Project on Climate Agreements* (July 2016) <http://belfercenter.ksg.harvard.edu/files/160700_horton-keith-honegger_vp2.pdf>;

[21] See Kerryn Brent, Jeffrey McGee and J McDonald, 'The Governance of Geoengineernig: An emerging Challenge for International and Domestic Legal Systems?' (2015-2016) 24(1) *Journal of Law, Information and Science* EAP 1.

[22] Oran R Young, Leslie A King, and Heike Schroeder (eds) *Institutions and Environmental Change: Principal Findings, Applications and Research Frontiers* (MIT Press, 2008) glossary.

[23] See Ian D Lloyd and Michael Oppenheimer, 'On the design of an international governance framwork for geoengineering ' (2014) 14(2) *Global Environmental Politics* 45, 46.

There has been some consideration from international law scholars of the potential application of the no-harm rule to geoengineering.[24] Such consideration has typically focused on the potential of the no-harm rule to form the basis of a claim for state responsibility or liability for transboundary harm once it has been caused.[25] There is little understanding of its capacity as a primary rule of international law[26] to influence the behaviour and decision-making of states in order to prevent harm in the first place. Existing research on the no-harm rule and SRM is also limited, and stands against more widespread, general claims in geoengineering governance literature that international law does not govern geoengineering, as well as claims that current international law actually *encourages* the development of geoengineering.[27] For example, leading international governance scholar Scott Barrett has stated that 'countries are more or less free to do what they want' with regards to future attempts at geoengineering.[28] Such claims are typically made with reference to existing treaty regimes and without detailed consideration of rules of customary international law and the role it plays in international environmental governance.[29]

This project challenges such claims by providing a detailed analysis of the no-harm rule and enhances the understanding of legal and geoengineering scholars alike as to what role the no-harm rule might play in governing the risks of SRM. The main focus is on the role and function of the no-harm rule as a primary rule of international law, and not merely a means for triggering 'secondary' rules of state responsibility, or as a means to claim reparations for harm.[30] This

[24] See, eg, Barbara Saxler, Jule Siegfried and Alexander Proelss, 'International liability for transboundary damage arising from stratospheric aerosol injections' (2015) 7(1) *Law, Innovation and Technology* 112; David Reichwein et al, 'State Responsibility for Environmental Harm from Climate Engineering' (2015) 5(2-4) *Climate law* 142; Anna-Maria Hubert and David Reichwein, 'An Exploration of a Code of Conduct for Responsible Scientific Research involving Geoengineering: Introduction, Draft Articles and Commentaries' (IASS, Potsdam Institute for Science, Innovation and Society, University of Oxford, 2015), Draft Article 7.
[25] Saxler, Siegfried and Proelss, above n 24; Reichwein et al, above n 24.
[26] These are substantive rules of international law that require, permit or prohibit certain conduct on behalf of a state. See Alan E. Boyle, 'State Responsibility and International Liability for Injurious Consequences of Acts Not Prohibited by International Law: A Necessary Distinction?' (1990) 39(1) *The International and Comparative Law Quarterly* 1, 10. See also Chapter 2.3.
[27] For an example of this view expressed in popular media, see Michael Marshall, 'Geoengineers are free to legally hack the climate' *New Scientist*, (1 November 2013) <https://www.newscientist.com/article/mg22029413-800-geoengineers-are-free-to-legally-hack-the-climate/>. In this article, geoengineering governance scholars Jess Reynolds and Scott Barrett suggest that international law does not restrain states from engaging in geoengineering. See also Jesse Reynolds, 'Climate Engineering Field Research: The Favorable Setting of International Environmental Law' (2014) 5 *Washington and Lee Journal of Energy, Climate, and the Environment* 417.
[28] Quoted in Marshall, above n 27.
[29] See Chapter 2.1.
[30] Boyle, above n 26, 10. This distinction is followed by the International Law Commission in the 'Draft Articles on Responsibility of States for Internationally Wrongful Acts, with commentaries' (2001) II(2) *Yearbook of the International Law Commission* 31 ('*Draft Articles on State Responsibility*').

project therefore considers the content of the no-harm rule, as well as questions of compliance. As noted by Raustiala and Slaughter, '[l]aw and compliance are conceptually linked because law explicitly aims to produce compliance with its rules'.[31] There are different understandings of compliance with international law. This research takes a causative approach to considering compliance with the no-harm rule.[32] That is, it not only considers whether states are likely to meet their obligations under the no-harm rule, but the extent to which such behaviour is driven by the rule itself. This approach therefore overlaps with certain understandings of the effectiveness of legal rules, being 'the degree to which a rule induces changes in behaviour that further the rule's goals'.[33]

This project therefore aims to:

(1) Analyse the content of the no-harm rule and how it would apply to SRM;

(2) Assess whether states are likely to comply with the no-harm rule, as currently formulated, in developing and attempting SRM; and

(3) Consider how the no-harm rule might be developed to better respond to the risks of SRM and prevent harm to the global environment.

In resolving these issues, this work contributes to the existing scholarship on geoengineering by providing a detailed analysis of the potential of the no-harm rule to contribute to geoengineering governance. At the same time, it contributes to a deeper understanding of the no-harm rule by undertaking a comprehensive chronological analysis of the rule's development through key legal sources, including recent interpretation by the ICJ in the 2015 case *Certain Activities Carried Out by Nicaragua in the Boarder Area (Costa Rica v Nicaragua) & Construction of a Road in Costa Rica Along the San Juan River (Nicaragua v Costa Rica).*

[31] Kal Raustiala and Anne-Marie Slaughter, 'International Law, International Relations and Compliance ' in Walter Carlsnaes, Thomas Risse and Beth Simmons (eds), *Handbook of International Relations* (Sage Publications, 2002) 538, 583.

[32] See David Hunter, James Salzman and Durwood Zaelke, *International Environmental Law and Policy* (Foundation Press, 4 ed, 2011) 362. Hunter, Salzman and Zaelke define compliance in the context of multilateral environmental agreements (MEAs) as the measure of an MEA's success at changing behaviour of key actors.

[33] See also Raustiala and Slaughter, above n 31, 589; Andrew T. Guzman, *How International Law Works: A Rational Choice Theory* (Oxford University Press, Inc., 2008) 22-23; Oran R Young and Marc A Levy, 'The Effectiveness of International Environmental Regimes' in Oran R Young (ed), *The Effectiveness of International Environmental Regimes* (Massachusetts Institute of Technology, 1999) 1, 4-6. The approach in this project combines what Young describes as the 'legal approach' and the 'political approach' to effectiveness. The legal approach focuses on the degree to which obligations are met. The political approach focuses on how rule or regimes change behaviour. These approaches are distinct from the so-called 'problem solving' approach to effectiveness, which is whether or not rule or regimes alleviate a specific problem (at 4). As SRM has not yet been conducted, it is impossible to consider effectiveness from this perspective.

In order to achieve these aims, this project takes an interdisciplinary approach to analysing the no-harm rule. It integrates doctrinal legal analysis with Jutta Brunnée and Stephen J Toope's theory of interactional international law.[34] Doctrinal legal analysis is used to trace the historical development the no-harm rule through authoritative international law sources to assess its purpose and content. This understanding of the no-harm rule is then applied to proposed SRM geoengineering to determine the extent to which the no-harm rule is likely to respond to the risks of these proposals. This project then analyses the no-harm rule against interactional law theory. Interactional law theory is a theory of legal obligation, being a sense of legal legitimacy and commitment or 'fidelity' to international law that promotes compliance.[35] Brunnée and Toope understand laws to be legitimate when the internal features of a legal norm promote compliance with that rule as well as to the rule of law itself.[36] This theory explains how legal norms can be made to promote a strong sense of legal legitimacy and legal obligation that, in turn, increases the likelihood of compliance. This is important in the international law system which lacks coercive enforcement mechanisms and mandatory means of dispute resolution characteristic of domestic legal systems. This research assesses the no-harm rule against interactional law theory to determine its capacity to promote a sense of legal obligation and, consequently, whether the rule is likely to promote compliance from states should they decide to attempt SRM in the future. The results of these two lines of inquiry are used to recommend how the no-harm rule might be further developed to better contribute to the governance of SRM.

This research suggests that the capacity of the no-harm rule to respond to the risks of harm posed by SRM would differ depending on the nature of the risks. That is, whether they are risks of transboundary harm to the territory of another state or harm to the atmosphere *per se*. The findings in this project indicate that the no-harm rule is better placed to respond to risks of transboundary harm from SRM than risks of harm to the atmosphere *per se*. The content of the no-harm rule is more firmly established in the context of transboundary harm. Application of

[34] Jutta Brunnée and Stephen J Toope, *Legitimacy and Legality in International Law: An Interactional Account* (Cambridge University Press, 2010).
[35] Brunnée and Toope, 7.
[36] Ibid, 52-53. In some respects, this understanding of legitimacy reflects that of Thomas Franck. See Thomas M Franck, 'Legitimacy in the International Law System' (1988) 82 *American Journal of International Law* 705, 713. However, Brunnée and Toope distinguish their theory from Franck's, as they privilege the role of different internal features in building legitimacy. Brunnée and Toope's understanding of legitimacy is also distinct from other theories of legitimacy in international law. See, eg, Daniel Bodansky, 'The Legitimacy of International Governance: A Coming Challenge for International Environmental Law?' (1999) 93(3) *The American Journal of International Law* 596; Mattias Kumm, 'The Legitimacy of International Law: A Constitutionalist Framework of Analysis' (2004) 15(5) *European Journal of International Law* 907.

interactional law theory also suggests that the no-harm rule is more likely to generate a sense of legal obligation in this context. In comparison, it is less clear how the content of the no-harm rule should be interpreted to apply to risks of harm to the atmosphere. The no-harm rule is also less likely to promote a sense of legal obligation, thereby reducing the prospect of compliance in this context. Given the risks of harm that SRM poses to the atmosphere, this project recommends that future development of the no-harm rule should, as a priority, aim to bolster the rule's capacity in this regard.

Having summarised the key elements of this research, the remainder of this introduction proceeds in four sections. Section 1.1 introduces SRM geoengineering and highlights key environmental risks and governance challenges. Section 1.2 explains how existing international agreements do not adequately respond to the risks of SRM. Section 1.3 provides an overview of the theoretical approach taken in this project and why this approach is important. Finally, section 1.4 outlines the chapters of this thesis.

1.1 SOLAR RADIATION MANAGEMENT GEOENGINEERING

Solar radiation management (SRM) is a class of proposed geoengineering technologies. SRM seeks to reduce rising global temperatures associated with climate change by reflecting a portion of incoming solar radiation (i.e. sunlight) away from the Earth.[37] The most discussed SRM proposal, stratospheric aerosol injection (SAI), would mimic the cooling effect of a large volcanic eruption by creating a fine layer of particles in the stratosphere to reflect away a proportion of incoming solar radiation. Given the prominence of SAI, the analysis in this research is specifically directed at these proposals. Nevertheless, certain aspects of the analysis in this research may also be relevant to other proposed methods of geoengineering, including other SRM proposals and carbon dioxide removal proposals. This section provides a detailed overview of SAI proposals, with a view to highlighting the risks and uncertainties associated with them.

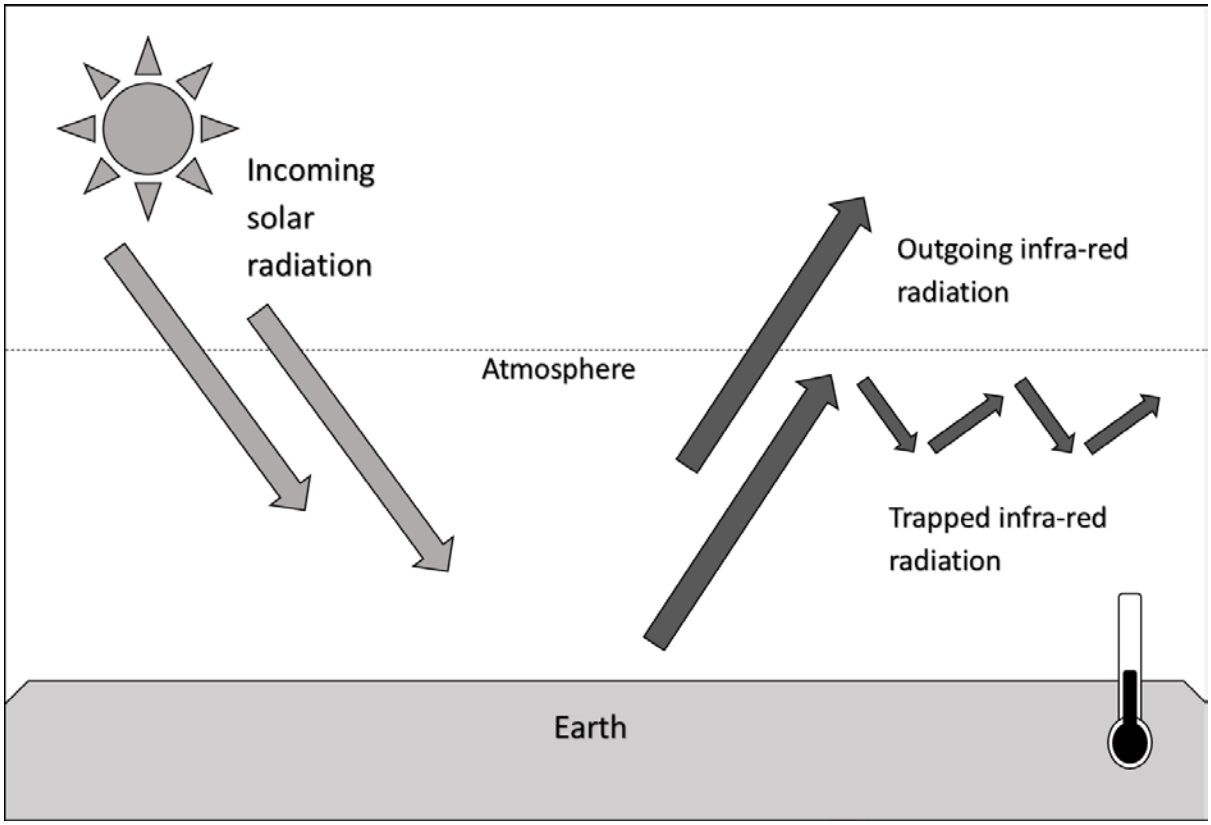
1.2.1 What is SRM and why is it being proposed?

The aim behind SAI (and SRM more generally) is to reduce global mean surface temperatures by altering the amount of energy that enters and leaves the Earth's atmosphere. The Earth's temperature (and hence climate) is determined by three elements: (1) incoming solar radiation energy from the sun; (2) the Earth's 'albedo' or reflectivity; and (3) the 'greenhouse' effect

[37] See *Royal Society Report*, above n 12, 23.

produced by greenhouse gases (GHGs) in the atmosphere.[38] Burch and Harris describe these elements as forming the Earth's 'energy budget', as each element influences 'how much energy enters and leaves the climate system.'[39] To put it simply, incoming solar radiation enters the Earth's atmosphere, where an amount is absorbed by the Earth's surface and some emitted into the atmosphere as infrared radiation.[40] Some of this infrared radiation escapes back out into space with the residual trapped in the atmosphere by GHGs.[41] It is this 'energy budget' that has kept the Earth's surface and atmospheric temperatures at levels that are consistent with human flourishing over the last several thousand years. Figure 1.1 below provides a simplified representation of the Earth's energy budget.

Figure 1.1 The Earth's energy budget[42]

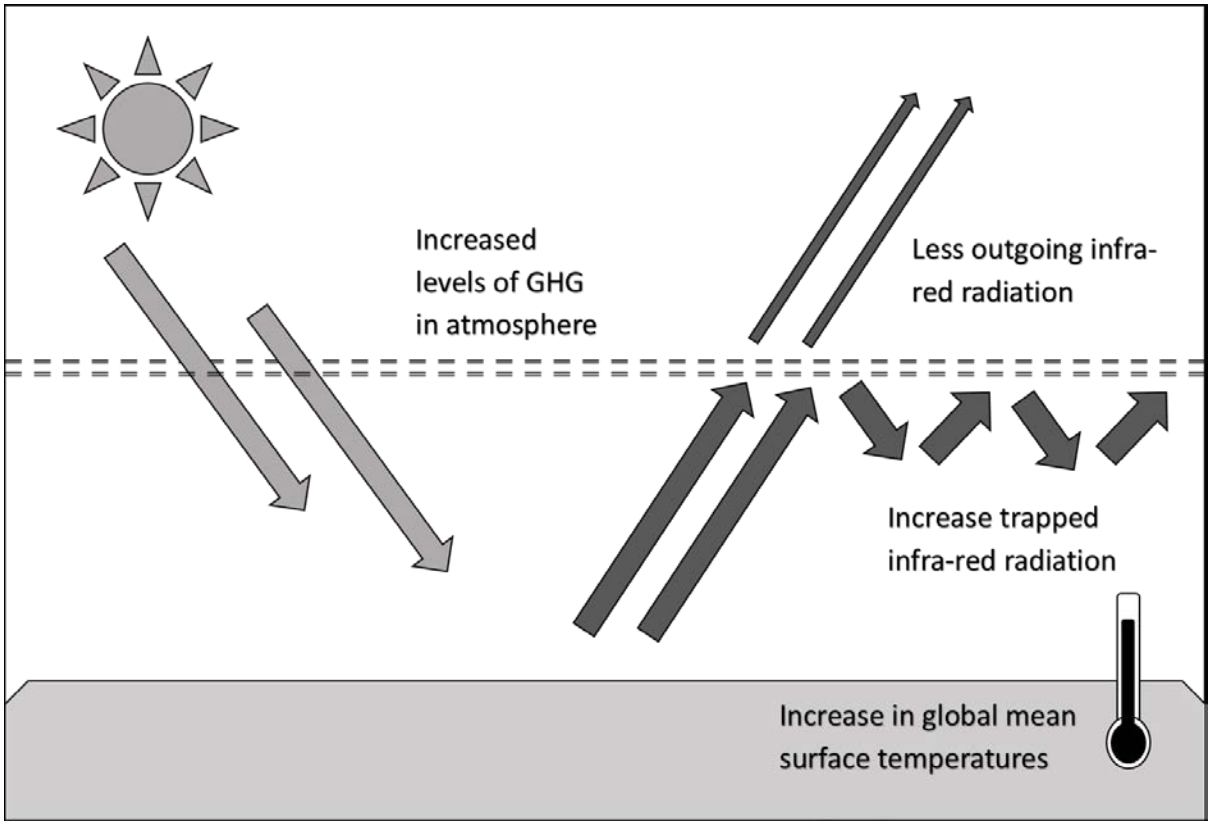


[38] Sarah L Burch and Sara E Harris, *Understanding Climate Change: Science, Policy and Practice* (University of Toronto Press, 2014) 51.
[39] Ibid, 51.
[40] Burch and Harris, above n 38, 53. Burch and Harris note that approximately 30% of incoming solar radiation is reflected by clouds, dust and aerosols in the atmosphere.
[41] Ibid, 54.
[42] In order to clearly visualise the purpose of SRM, this diagram, and the further two below, do not represent the amount of incoming solar radiation that is naturally reflected by clouds, dust and aerosols in the atmosphere. See note 39 above.

Human activities, such as the burning of fossil fuels, have over the last 200 years significantly increased the concentration of greenhouse gases in the atmosphere thereby trapping more outgoing infrared radiation and disturbing the Earth's energy budget. The Intergovernmental Panel on Climate Change's (IPCC) Fifth Assessment Report states that human activities have caused the Earth's atmospheric concentration of GHGs (i.e. carbon dioxide, methane and nitrous oxide) to increase to their highest levels in 800,000 years.[43] In the words of the IPCC, it is 'extremely likely' that the increased level of GHGs in the atmosphere is the dominant cause of climate change.[44] The increase in carbon dioxide emissions from fossil fuel combustion is of particular concern to scientists. Approximately 80% of the total increase in GHG emissions from 1970-2010 came from fossil fuel combustion and industrial processes.[45] In May 2013, the Mauna Loa observatory in Hawaii recorded atmospheric carbon dioxide levels over 400 ppm for the first time.[46] The changes to the Earth's energy budget due to increased levels of GHGs in the atmosphere is represented in figure 1.2 below.

[43] Intergovernmental Panel on Climate Change, 'Summary for Policymakers' in *Climate Change 2013: The Physical Science Basis. Contribution of Working Group I to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change* (Cambridge University Press, 2013) 29 <http://www.climatechange2013.org/images/report/WG1AR5_ALL_FINAL.pdf> 4. According to this report, the atmospheric concentration of these GHGs in 2011 were as follows: carbon dioxide was 40% higher than pre-industrial levels at 391 parts per million (ppm); methane was 150% higher than pre-industrial levels at 1803 parts per billion (ppb); and nitrous oxide was 20% higher than pre-industrial levels at 324 ppb (at 11).
[44] Intergovernmental Panel on Climate Change, 'Summary for Policymakers' in *Climate Change 2014: Synthesis Report. Contribution of Working Groups I, II and III to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change* (IPCC, 2014) <http://www.ipcc.ch/report/ar5/syr/> ('*AR5 Synthesis Report Summary for Policymakers*') 4.
[45] Ibid, 5.
[46] National Ocean and Atmospheric Administration (NOAA), *Carbon Dioxide at NOAA's Mauna Loa Observatory reaches new milestone: Tops 400 ppm* (10 May 2013) <http://research.noaa.gov/News/NewsArchive/LatestNews/TabId/684/ArtMID/1768/ArticleID/10061/Carbon-Dioxide-at-NOAA%E2%80%99s-Mauna-Loa-Observatory-reaches-new-milestone-Tops-400-ppm.aspx>.

Figure 1.2 How increased levels of GHGs in the atmosphere has changed the Earth's energy budget



Scientists propose to develop geoengineering technology as a means of addressing this energy imbalance. One class of proposed methods is carbon dioxide removal (CDR). The aim of CDR is to address the increased atmospheric concentration of greenhouse gases by removing carbon dioxide directly from the atmosphere (i.e. direct air capture) and storing it for a sufficiently long period to influence the global energy budget.[47] Numerous techniques have been proposed to capture and store carbon dioxide in the land or in the oceans. Examples of proposed land-based CDR techniques include: afforestation and reforestation;[48] bioenergy with carbon

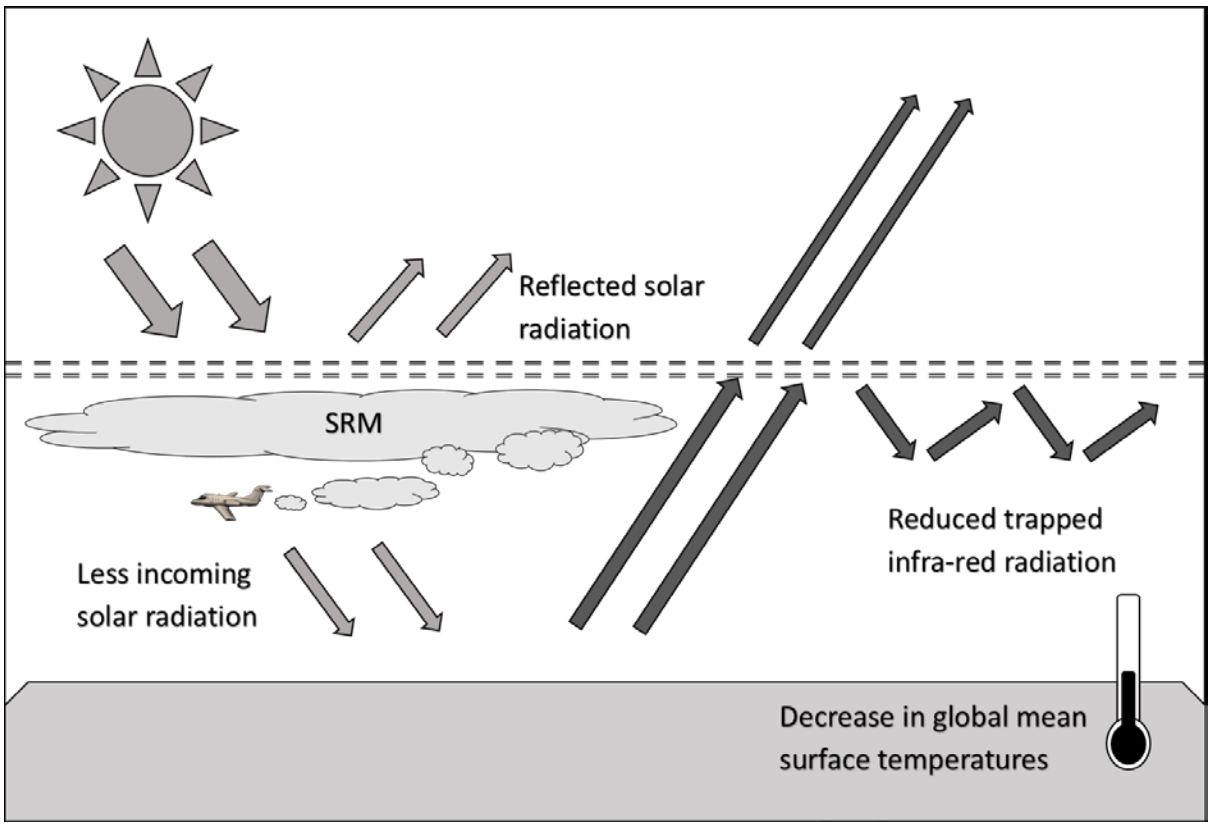
[47] See *Royal Society Report*, above n 12, 9.

[48] See National Research Council, *Climate Intervention: Carbon Dioxide Removal and Reliable Sequestration* (The National Academies Press, 2015) <http://www.nap.edu/catalog/18805/climate-intervention-carbon-dioxide-removal-and-reliable-sequestration> 39 ('*NRC CDR Report'*). Afforestation and reforestation are proposals to restore deforested land in order to create a land-based carbon sink. According to the *Royal Society Report*, afforestation and reforestation are not traditionally identified as 'geoengineering'. See *Royal Society Report*, above n 12, 10.

capture and storage;[49] and direct air capture and sequestration.[50] Examples of proposed ocean-based CDR include: Ocean Iron Fertilization (OIF) and ocean upwelling/downwelling.[51]

By contrast, SRM is intended to directly address the 'effects' of climate change, namely rising global mean surface temperatures.[52] Scientists propose SRM to limit the amount of incoming solar radiation to compensate for the increased absorption of infrared radiation in the atmosphere.[53] Instead of allowing more energy to escape the atmosphere, SRM would reduce the amount of energy entering in the first place. Figure 1.3 below represents how SRM would influence the Earth's energy budget.

Figure 1.3 How SRM would influence the Earth's energy budget



[49] See *NRC CDR Report*, above n 48, 63. According to the *NRC CDR Report*, biomass (i.e. vegetation) draws carbon dioxide from the atmosphere through photosynthesis. The concept behind this form of CDR is to use biomass to produce energy/electricity. The carbon dioxide released in this process would be captured at source to prevent it from entering the atmosphere.
[50] See ibid, 67. These are proposals to chemically 'scrub' (i.e. remove) carbon dioxide directly from ambient air and store it.
[51] See *Royal Society Report*, above n 12, 19
[52] *Royal Society Report*, above n 12, ix.
[53] Ibid, 23.

Proposed SRM technologies aim to reduce the amount of incoming solar radiation by enhancing the reflectivity ('albedo') of the earth.[54] One proposed method of SRM is to increase the amount of solar radiation reflected away from the Earth by placing giant mirrors into outer space to orbit the earth at strategic locations.[55] Another proposal is to increase the brightness of naturally-formed ocean clouds so that they reflect more sunlight.[56] However, this research focuses on stratospheric aerosol injection (SAI), as it is the most prominently discussed proposal.

1.2.2 Stratospheric aerosol injection (SAI): A proposed method of SRM

SAI is an SRM geoengineering proposal designed to mimic the climatic effects of large volcanic eruptions.[57] Scientist propose creating a fine layer of a minute aerosol particles in the stratosphere.[58] The particles would be created in the stratosphere using modified weather balloons, jet aircraft or military artillery.[59] Unlike the troposphere (the lowest layer of the atmosphere in which we experience weather) the stratosphere is relatively stable with little convection (upwards and downwards movement of air).[60] Scientists suggest that particles could therefore remain suspended in the stratosphere for 12 months or more.[61] Once in the stratosphere, these particles would create a fine reflective layer intended to prevent a percentage of incoming solar radiation from reaching the Earth's surface.[62]

SAI is one of the most prominent geoengineering proposals due to its perceived affordability, short-term feasibility and likely effectiveness in reducing temperatures.[63] According to the *Royal Society Report*, SAI is likely to be highly effective in reducing global temperatures and

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[54] Ibid.
[55] Committee on Science, Engineering and Public Policy (COSEPUP), *Policy Implications of Greenhouse Warming: Mitigation, Adaptation, and the Science Basis*, (National Academy Press, 1991) 448.
[56] See *EuTRACE Report*, above n 14, 44-46.
[57] Ibid, 22. See also Paul J Crutzen, 'Albedo Enhancement by Stratospheric Sulfur Injections: A Contribution to Resolve a Policy Dilemma?' (2006) 77(3-4) *Climatic Change* 211.
[58] *Royal Society Report*, above n 12, 29. According to this report, the most prominent proposal is to use sulphate aerosols. However, some scientists advocate using other substances, such as aluminia particles or diamond dust as they may have less undesirable side effects. See Andy Extance, 'Climate scientists ponder spraying diamond dust in the sky to cool the planet', *Nature News* 26 October 2015 <http://www.nature.com/news/climate-scientists-ponder-spraying-diamond-dust-in-the-sky-to-cool-planet-1.18634>.
[59] See *Royal Society Report*, above n 12, 32. See also Alan Robock et al, 'Benefits, risks, and costs of stratospheric geoengineering' (2009) 36(19) *Geophysical Research Letters* L19703, 4-6.
[60] Burch and Harris, above n 38, 40-41.
[61] *Royal Society Report*, above n 12, 29. Particles in the troposphere would only stay suspended for a short period of time (days or weeks) before being rained out. See ibid, 40-41.
[62] See, e.g. *Royal Society Report*, above n 12, 29; National Research Council, *Climate Intervention: Reflecting Sunlight to Cool the Earth* (The National Academies Press, 2015) <http://www.nap.edu/catalog/18988/climate-intervention-reflecting-sunlight-to-cool-earth> ('*NRC SRM Report*') 66-67. The NRC report notes that aerosols naturally exist in the stratosphere and SAI would increase the amount of aerosols in the stratosphere.
[63] See *EuTRACE Report*, above n 14, 22.

could be feasibly developed in the near future.[64] Scientists are yet to field test SAI in the stratosphere. Nevertheless, they are confident it will have a cooling effect from observing the climatic cooling effects produced by large volcanic eruptions, such as from the 1991 eruption of Mt Pinatubo in the Philippines.[65] As prominent atmospheric chemist Crutzen notes in his seminal paper on SAI, the eruption of Mt Pinatubo in 1991 injected around 10 teregrams (approx. 10000 kilotons) of sulphur into the stratosphere that cooled the global mean surface temperatures by 0.5˚C within 12 months.[66] SAI is essentially intended to mimic this phenomenon.

The promise that SAI could reduce global temperatures within 12 months of deployment makes it attractive as an 'emergency response' to climate change.[67] For example, it has been suggested that SAI could be deployed to prevent abrupt and/or irreversible climate change impacts, such as the melting of tundra or ice caps.[68] More recently, scientists have begun to consider conducting SAI as a 'complement' to climate change mitigation strategies, rather than as an emergency substitute or alternative.[69] Keith and MacMartin propose that SRM could be conducted on a more moderate scale, alongside mitigation and carbon dioxide removal efforts, as a temporary means to limit the 'rate and absolute magnitude' of climate change.[70] This proposal envisages SAI playing an important role in medium- to long-term global strategies to respond to climate change.

The final perceived benefit of SAI is its apparent affordability. Generally speaking, SRM proposals appear to be relatively affordable compared to CDR proposals, such as ocean iron fertilization.[71] Robock et al suggest that the annual cost of deploying SAI would vary depending on the method by which it is delivered into the stratosphere. For example, they suggest that it may be significantly cheaper to deliver the sulphates into the stratosphere using modified aircraft compared to weather balloons or military artillery.[72] Early estimates suggest that SAI could cost as little as US$1 billion per annum.[73] The cost of SAI could also be

[64] *Royal Society Report*, above n 12, 31.
[65] Crutzen, above n 57, 212.
[66] Ibid.
[67] *The Royal Society Report*, above n 12, 31.
[68] See Nils Markusson et al, ''In case of emergency press here': framing geoengineering as a response to dangerous climate change' (2014) 5(2) *Wiley Interdisciplinary Reviews: Climate Change* 281, 282.
[69] David W. Keith and Douglas G. MacMartin, 'A temporary, moderate and responsive scenario for solar geoengineering' (2015) 5(3) *Nature Climate Change* 201.
[70] Ibid, 205-206.
[71] See *NRC SRM Report*, above n 62, 4 Table S.1.
[72] Robock et al, above n 58, 7.
[73] See Scott Barrett, 'The incredible economics of geoengineering' (2008) 39(1) *Environmental and Resource Economics* 45, 49. For a more recent summary of cost estimates see *EuTRACE Report*, above n 14, 42.

significantly less – up to 1000 times cheaper - than traditional climate change mitigation strategies.[74] However, these perceived benefits of SAI must be weighed against the significant uncertainty and potential environmental and associated social risks inherent in these proposals.

In scientific literature, the terms "risk" and "uncertainty" are often attributed different meanings. Gardiner provides a simple explanation of this use, stating that: '[i]n the technical sense, a risk involves a known, or reliably estimable, probability that a certain set of outcomes may occur, whereas an uncertainty arises when such probabilities are not available.'[75] Both terms are commonly used in geoengineering literature, however the extent to which their use mirrors this understanding is unclear. The term 'risk' is typically used to refer to potential negative side effects of SAI that have been identified on the basis of climate modelling,[76] or from observing the effects of large volcanic eruptions.[77] The term 'uncertainty' is typically used to describe potential side effects that are not so readily identifiable. In other words, these terms appear to be used more on the basis of discernibility than relating to probability. This trend is unsurprising, given that scientists have limited capacity to quantify risks and magnitude of the potential side-effects of SAI at the present time.[78] Generally speaking, the use of the terms 'risk' and 'uncertainty' in this project mirrors this trend in geoengineering literature.

Uncertainty and potential side effects of SAI

There is significant scientific uncertainty as to how SAI will affect the global climate system and the precise nature and magnitude of side effects it could have at regional and global scales.[79] It is thought that SAI will produce both 'winners and losers': some states and/or

[74] Gordon MacKerron, 'Costs and economics of geoengineering' (2014) *Climate Geoengineering Governance Working Paper Series: 013* <http://www.geoengineering-governance-research.org/perch/resources/workingpaper13mackerroncostsandeconomicsofgeoengineering.pdf>, 11

[75] Stephen M Gardiner, 'Ethics and Global Climate Change ' in Stephen M Gardiner et al (eds), *Climate Ethics-Essential Readings* (Oxford University Press, 2010) 3

[76] See, eg, Alan Robock, 'Stratospheric Aerosol Geoengineering' in Roy Harrison and Ron Hester (eds), *Geoengineering of the Climate System* (The Royal Society of Chemistry, 2014) 162, 164; J F Tjiputra, A Grini and H Lee, 'Impact of idealized future stratospheric aerosol injection on the large-scale ocean and land carbon cycles' (2016) 121(1) *Journal of Geophysical Research: Biogeosciences* 2; Victor Brovkin et al, 'Geoengineering climate by stratospheric sulfur injections: Earth system vulnerability to technological failure' (2009) 92(3-4) *Climatic Change* 243.

[77] See, eg, Robock et al, above n 58, 2.

[78] See Joshua B Horton, Andrew Parker and David Keith, 'Liability for Solar Geoengineering: Historical Precedents, Contemporary Innovations, and Governance Possibilities ' (2015) 22 *New York University Environmental Law Journal* 225, 242. Horton, Parker and Keith state that the probability, magnitude, and location of potential harm from SAI is are likely to vary in 'unpredictable ways' depending on the way in which SAI would be conducted. This include the rate and size of SAI deployment, as well as where in the world it is being deployed.

[79] See, *Royal Society Report*, above n 12, 12, 31, 34. This report states that further research and development is needed to 'assess uncertainties about effectiveness and undesired side effects' of SRM.

regions may benefit whereas others may suffer detrimental side effects.[80] For example, based on climate modelling and observations following large volcanic eruptions, some scientists suggest that SAI could alter regional precipitation and change the patterns of the Asian and African monsoons.[81] Yang et al suggest that this could reduce the yield of certain crops in areas likely to be affected.[82] The *Royal Society Report* further notes that the impacts of SAI could adversely affect regional food security.[83] SAI could also delay the recovery of, or even further deplete, the stratospheric ozone layer.[84] The changes to precipitation and sunlight (intensity and scattering of light) may affect ecosystems and biological processes such as photosynthesis.[85] It could also increase surface acid deposition, in the form of acid rain.[86] The final report produced by the European Transdiciplinary Assessment of Climate Engineering ('*EuTRACE Report'*) and the 2015 report on SRM by the US National Academy of Sciences National Research Council ('*NRC SRM Report'*) both recognise that SAI could have unforeseen side effects that may only be identified after the technology has been deployed.[87]

The 'termination problem'

A further risk associated with SAI (and other SRM proposals more generally) is what some refer to as the 'termination problem'.[88] As noted above, if particles were created in the stratosphere, they would not remain there indefinitely. If SAI were commenced then halted, the Earth's reflectivity would decrease, allowing more solar radiation to enter the atmosphere.

[80] See Scott Barrett et al, 'Climate engineering reconsidered' (2014) 4(7) *Nature Clim. Change* 527, 528 Figure 1.
[81] See Robock, 'Stratospheric Aerosol Geoengineering', above n 76, 174-175; *Royal Society Report*, above n 12, 31. See also *NRC SRM report*, above n 62, 84-85. But see Jesse L. Reynolds, Andy Parker and Peter Irvine, 'Five solar geoengineering tropes that have outstayed their welcome' (2016 (forthcoming)) *Earth's Future* doi: eft2.2016EF000416 , 5-6. Reynolds et al suggest that the degree to which precipitation from monsoon patterns would be reduced would be a direct consequence of the scale and magnitude of SRM being conducted. They therefore claim that this is not an 'inevitable result' of SRM, so long as it was conducted on a modest scale.
[82] Huiyi Yang et al, 'Potential negative consequences of geoengineering on crop production: a study of Indian groundnut' (2016) *Geophysical Research Letters.* Yang et al focus on the impact on groundnut yields in India. They state that this crop accounts for 3% of Indian agricultural output, and would be significantly affected by attempts at SAI.
[83] *Royal Society Report*, above n 12, 31.
[84] See, e.g., *NRC SRM Report*, above n 62, 86; P Heckendorn et al, 'The impact of geoengineering aerosols on stratospheric temperature and ozone' (2009) 4(4) *Environmental Research Letters* 045108; Robock, 'Stratospheric Aerosol Geoengineering' above n 76, 167-168.
[85] *NRC SRM Report*, above n 62, 94. This report indicates that SAI could have negative and positive effects in this regard.
[86] Ibid, 94. However, it is thought that the contribution of SAI to acid rain/snow would be minimal compared to current industrial pollution. See also Intergovernmental Panel on Climate Change, *Climate Change 2013: The Physical Science Basis. Contribution of Working Group I to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change* (Cambridge University Press, 2013) <http://www.climatechange2013.org/images/report/WG1AR5_ALL_FINAL.pdf> chapter 7, 634.
[87] *EuTRACE Report*, above n 14, 44; *NRC SRM Report*, above n 62, 95.
[88] *Royal Society Report*, above n 12, 24.

Scientists fear that if SAI is implemented but the atmospheric concentration of GHGs remains high, halting SAI could cause global temperature to increase rapidly, creating far more serious problems.[89] According to Ross and Matthews, if planetary-scale geoengineering (like the injection of sulphate aerosol particles) were suddenly stopped, the rate of subsequent warming could be so high that it could seriously impact on ecosystems and compromise their ability to naturally adapt to climate change.[90] Therefore, while SAI might lower global temperatures and reduce some of the impacts associated with climate change, the termination problem means that deploying SAI could nevertheless introduce a new risk of triggering a rapid increase in global temperatures in its own right.[91]

Sporadic or uncoordinated attempts at SAI may result in similar negative impacts, for example, if different states decided to deploy SAI at the same time without coordinating their efforts. Matthews and Caldiera suggest that poor international coordination over the future deployment of SAI could also trigger high rates of change in global temperatures:

> In the case of inconsistent or erratic deployment (either because of shifting public opinions or unilateral action by individual nations), there would be the potential for large and rapid temperature oscillations between cold and warm climate states. It is also likely that such scenarios would lead to uneven spatial application of geoengineering...Temporally and spatially patchy attempts at geoengineering would pose significant challenges to adaptation by human societies and natural ecosystems.[92]

Similar issues could arise if a large volcanic eruption were to occur while SAI is being conducted.[93] As noted above, large volcanic eruptions can produce a similar cooling effect by injecting particles into the stratosphere. Laakso et al note that it is impossible to predict the timing of large volcanic eruptions, but they nevertheless occur frequently enough to make it possible that one might coincide with any future SRM activity.[94]

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[89] See *Royal Society Report*, above n 12, 24. See also Brovkin et al, above n 76, 243. But see Reynolds, Parker and Irvine, above n 81, 3. Reynolds et al suggest that termination shock could be avoided by conducting SRM to only produce a low degree of cooling, or by slowly ramping down the amount of radiative forcing over decades.
[90] Andrew Ross and H Damon Matthews, 'Climate engineering and the risk of rapid climate change' (2009) 4(4) *Environmental Research Letters* 045103 57, 4.
[91] J G Shepherd, 'Geoengineering the climate: an overview and update' (2012) 370(1974) *Phil. Trans. R. Soc. A* 4166, 4107.
[92] H Damon Matthews and Ken Caldeira, 'Transient climate–carbon simulations of planetary geoengineering' (2007) 104(24) *Proceedings of the National Academy of Sciences* 9949, 9952.
[93] For a discussion of this possibility and modelling predictions, see A. Laakso et al, 'Radiative and climate impacts of a large volcanic eruption during stratospheric sulfur geoengineering' (2016) 16(1) *Atmos. Chem. Phys.* 305
[94] Ibid, 306.

High atmospheric concentration of CO_2

SAI (and SRM techniques more generally) would not do anything to reduce the level of CO_2 in the atmosphere. High levels of CO_2 have environmental impacts other than enhancing the Earth's greenhouse effect. Scientists are concerned that these additional impacts would persist if SAI were deployed and atmospheric CO_2 levels remained high.[95]

A primary concern is ocean acidification. The Earth's oceans are a 'carbon sink', meaning that they naturally absorb CO_2 from the atmosphere.[96] Once absorbed, the CO_2 reacts with water to form carbonic acid and other products, including hydrogen ions.[97] As Burch and Harris explain, the increase in hydrogen ions lowers the oceans' pH, making the water more acidic.[98] Higher concentrations of CO_2 in the atmosphere means that more CO_2 will dissolve in the oceans, increasing their acidity.[99] According to scientists, increased ocean acidity can significantly impact on ocean organisms and ecosystems.[100] Unless carbon emissions are reduced, the problem of ocean acidification would persist, regardless of any effects on global mean surface temperatures from SAI.[101] Williamson and Turley further suggest that SRM techniques such as SAI might have 'secondary effects' on the ocean carbonate system. For example, changes to sunlight caused by SRM might affect the photosynthesis and production of vegetation and phytoplankton.[102] They also state that changes to the ocean temperature from SRM/SAI could have impacts on the ocean as a carbon sink, however, the nature and severity of these potential impacts are not yet known.[103]

Field testing and deployment

The term 'field testing' refers to geoengineering experiments 'conducted outside the lab and in the real world'.[104] SAI has not yet been field tested in the stratosphere. In 2009, a team of

[95] See, eg, Robock, '20 Reasons', above n 15, 15.
[96] See Burch and Harris, above n 38, 224. See also *Ocean Carbon Cycle*, NOAA PMEL Carbon Program <http://www.pmel.noaa.gov/co2/story/Ocean+Carbon+Uptake>.
[97] Phillip Williamson and Carol Turley, 'Ocean acidification in a geoengineering context' (2012) 370(1974) *Philosophical Transactions of the Royal Society of London A: Mathematical, Physical and Engineering Sciences* 4317, 4318. Burch and Harris, above n 38, 224; NOAA PMEL Carbon Program <http://www.pmel.noaa.gov/co2/story/Ocean+Carbon+Uptake>.
[98] Burch and Harris, above n 38, 224.
[99] Williamson and Turley, above n 97, 4318.
[100] Ibid, 4318. See also Burch and Harris, above n 38, 224.
[101] Robock, '20 Reasons', above n 15, 15.
[102] Williamson and Turley, above n 97, 4328-4329.
[103] Ibid, 4238.
[104] *SRMGI Report*, above n, 48.

Russian scientists tested aerosols at ground level to study their reflective characteristics.[105] Research has otherwise been confined to laboratory testing and climate modelling.[106] Some scientists argue that the utility of laboratory testing and climate modelling of SAI is limited and instead advocate field testing. Keith, Duren and MacMartin suggest that at some point in the future, field testing will be necessary to answer research questions that cannot be addressed by climate models.[107] A small group of scientists further suggest that small-scale field tests (i.e. tests that will not have any measurable impact on the global climate) might help resolve significant uncertainties surrounding SAI, such as how aerosol particles would form and operate in the stratosphere[108] and the impact they might have on stratospheric ozone.[109]

Proposals to field test SAI – even on a small scale – are highly controversial and subject to much debate in geoengineering literature.[110] There is concern that field testing might create a 'slippery slope' that would eventually lead to full-scale deployment.[111] In 2011, the Solar Radiation Management Governance Initiative ('SRMGI'), which was convened by The Royal Society, The World Academy of Sciences and the Environmental Defence Fund, released a report examining the governance of SRM research. With regard to research in general, the report noted that:

> Research could create momentum for development of SRM technology, as well as a lobbying constituency of scientists, engineers, investors and government agencies with an interest in pursuing SRM, leading to its eventual deployment. This constituency could use its influence to override moral and other objections or to unduly influence public opinion…Allowing SRM research, and thereby making it the status quo, could also create an inertia opposing the cessation of research even if there is evidence of overwhelming negative impacts. [112]

[105] Yu A. Izrael et al, 'Field experiment on studying solar radiation passing through aerosol layers' (2009) 34(5) *Russian Meteorology and Hydrology* 265.
[106] A key example is the Geoengineering Model Intercomparison Project ('GeoMIP'). GeoMIP is an ongoing research initiative that uses climate models to investigate the impacts of solar geoengineering methods (SAI and cloud brightening) on climate patterns. See Ben Kravitz et al, 'An overview of the Geoengineering Model Intercomparison Project (GeoMIP)' (2013) 118(23) *Journal of Geophysical Research: Atmospheres* 13.
[107] David W. Keith, Riley Duren and Douglas G. MacMartin, 'Field experiments on solar geoengineering: report of a workshop exploring a representative research portfolio' (2014) 372 *Phil. Trans. R. Soc.* A, 4-5.
[108] MacMynowski et al, above n 18, 5045.
[109] John A Dykema et al, 'Stratospheric controlled perturbation experiment: a small-scale experiment to improve understanding of the risks of solar geoengineering' (2014) 372(2031) *Philosophical Transactions of the Royal Society of London A: Mathematical, Physical and Engineering Sciences* 1.
[110] See e.g., Alan Robock et al, 'A Test for Geoengineering?' (2010) 327(5965) *Science* 530; Mike Hulme, *Can Science Fix Climate Change?* (Polity Press, 2014) 60-68;
[111] *SRMGI Report*, above n 13, 21.
[112] Ibid, 21.

In other words, field testing could normalise SAI as a response to climate change. It might also create vested interests in continuing the development of SAI, leading to technological 'lock in'.[113]

A further concern is that it may be hard to distinguish between field testing and full-scale deployment. The SRMGI report distinguishes between small-scale field testing, medium and large-scale field testing and full-scale deployment.[114] In this report, both medium and large-scale field testing and deployment involve conducting geoengineering on a large enough scale so as to produce measurable and significant environmental impacts.[115] The key difference between field testing and deployment is that deployment would seek to significantly affect the global climate for more than one year, and would be conducted with this purpose in mind, rather than merely for research.[116] However, Robock et al suggest that at a practical level large-scale field testing and deployment of SAI may be indistinguishable.[117] They argue that SAI cannot be effectively field tested unless it is on a scale comparable to full-scale deployment.[118] This is because it may be difficult to distinguish the impacts of an SAI field test from the natural variations in atmosphere and global climate system.[119] Robock et al therefore claim that in order for field tests to have measureable effects, they would need to be conducted on a sufficiently large scale and over a long period of time.[120] By this reckoning, field tests could therefore give rise to the same risks and side-effects as full-scale deployment.

Deployment in and changes to the global atmospheric commons

In addition to the possibility of SAI having unintended, detrimental side-effects, it is important to highlight that large-scale field testing and full-scale deployment of SAI will inevitably have impacts on the atmosphere. SAI is *intended* to change the chemical composition of the atmosphere and influence the global climate.[121] By its very nature, SAI would be conducted *in* and have impacts *on* the atmosphere as a global commons. This is not a 'risk' (i.e. a scientific probability) but a certainty, as it is the purpose and function of this proposed technology. This

[113] Neil Craik, 'International Law and Geoengineering: Do Emerging Technologies Require Special Rules?' (2015) 5(2-4) *Climate law* 111, 119. *SRMGI Report*, above n 13, 21.
[114] *SRMGI Report*, above n 13, 47-52.
[115] Ibid.
[116] *SRMGI Report*, above n 13, 52.
[117] Robock et al, above n 110, 530.
[118] Ibid.
[119] Ibid, 531.
[120] Ibid.
[121] The precise legal status of the atmosphere is unsettled. However, given that the atmosphere and global climate system exist beyond the individual sovereign control of states, it can best be described as a global commons area. This argument is elaborated in chapter 7. See also Soroos, above n 3, 7-8.

characteristic of SAI – the *certainty* that it will influence the global climate *regardless* of the probability of the unintended side effects of SAI - is particularly important to keep in mind when considering international law and governance.

1.2 THE INTERNATIONAL GOVERNANCE OF SRM

The potential for SAI to have transboundary and global impacts gives rise to questions of international law and governance. The need for SRM/SAI to be governed at an international level has been long recognised in geoengineering literature.[122] Concerns about the adequacy of existing international rules and regimes have arisen in parallel with these claims. This section provides a brief overview of these concerns. It examines how key international environmental agreements, including those directed at atmospheric pollution and degradation, do not provide an adequate governance framework for SAI.

1.2.1 The 1976 Convention on the Prohibition of Military or Any Other Hostile Use of Environmental Modification Techniques (ENMOD Convention)

The most relevant international agreement to the proposed development of SAI is the 1976 *ENMOD Convention*.[123] This convention was negotiated to protect humanity from the dangers of using weather and environmental modification technologies as a weapon.[124] Weather refers to the day-to-day changes in the atmosphere (i.e. wind, temperature and rain), whereas the climate is the long-term average of weather.[125] Shortly after the end of the Second World War, scientists in the United States developed weather modification technologies that aimed to influence the weather at a local scale over a short period of time. Examples included: enhancing the amount of rain or snow produced by naturally formed clouds ('cloud seeding');[126]

[122] For early examples, see, eg, Daniel Bodansky, 'May we engineer the climate?' (1996) 33(3) *Climatic Change* 309; Ralph J Cicerone, 'Geoengineering: encouraging research and overseeing implementation' (2006) 77(3) *Climatic Change* 221; John Virgoe, 'International governance of a possible geoengineering intervention to combat climate change' (2009) 95(1-2) *Climatic Change* 103.

[123] *Convention on the Prohibition of Military or Other Hostile Use of Environmental Modification Techniques*, opened for signature 10 December 1976, 1108 UNTS 151 (entered into force 5 October 1978) ('*ENMOD'*)

[124] See ibid, preamble.

[125] See Intergovernmental Panel on Climate Change, *Climate Change 2007: Working Group 1: The Physical Science Basis, Frequently Asked Question 1.2 What is the Relationship between Climate Change and Weather?* Intergovernmental Panel on Climate Change <https://www.ipcc.ch/publications_and_data/ar4/wg1/en/faq-1-2.html>.

[126] A recent example of cloud seeding to increase precipitation is in Kosciusko National Park, Australia, where hydroelectric company Snowy Hydro conducted 'cloud seeding' in an attempt to increase the amount of snowfall produced by clouds during the winter ski season. See Scott Hannaford, 'Concerns persist over long-term impact of cloud seeding in Kosciuszko', *Sydney Morning Herald* (online) 27 March 2015 <http://www.smh.com.au/technology/sci-tech/concerns-persist-over-longterm-impact-of-cloud-seeding-in-kosciuszko-20150327-13tj6c.html>.

dispersing cloud or fog;[127] and reducing the severity of hurricanes by seeding the eye wall of the hurricane with silver iodide.[128] The United States' interest in developing weather modification technologies included investigating its potential to be used as weapon during the Cold War. An infamous example of the military use of weather modification technology occurred during the Vietnam War, when the United States Air Force used cloud seeding technologies to cause flooding of the 'Ho Chi Minh trail' and thereby impede North Vietnamese troop movements.[129] This event triggered international concern over the potential for weather modification to be used as a weapon of mass destruction, and gave rise to the negotiation of the *ENMOD Convention* to prohibit the weaponisation of weather modification technology.[130]

The *ENMOD Convention* specifically addresses the use of weather and environmental modification techniques in a military context. Article I of the *ENMOD Convention* contains the purpose or object of the treaty and indicates that the parties to the *ENMOD Convention* are prohibited from engaging in environmental modification techniques for *military or other hostile purposes*. Environmental modification techniques are defined in Article II as 'any technique for changing – through the deliberate manipulation of natural processes – the dynamics, composition or structure of the earth, including its biota, lithosphere, hydrosphere and atmosphere, or of outer space.' This definition of 'environmental modification techniques' is arguably wide enough to include weather modification attempts at a local scale, as well as

[127] An example of weather modification (cloud seeding) for the purpose of dispersing clouds or fog was during the 2008 Beijing Olympics in China. See Clifford Coonan, 'How Beijing used rockets to keep opening ceremony dry', *The Independent* (online), 11 August 2008 <http://www.independent.co.uk/sport/olympics/how-beijing-used-rockets-to-keep-opening-ceremony-dry-890294.html>.

[128] H E Willoughby et al, 'Project Stormfury: A Scientific Chronicle 1962-1983' (1985) 66(5) *Bulletin American Meteorological Society* 505, 505–6. From 1962 to 1983, the United States government funded project 'Stormfury'. One of the goals of project Stormfury was to develop the means to modify hurricanes in order to reduce their intensity (at 505).

[129] See Jack Anderson, 'Air Force turns Rainmaker in Laos', *The Washington Post*, (Washington DC), 18 March 1971, F7. See also Louise A. Purrett, 'Weather Modification as a Future Weapon' (1972) 101(16) *Science News* 254; James Rodger Fleming, 'The pathological history of weather and climate modification: Three cycles of promise and hype' (2006) 37(1) *Historical Studies in the Physical and Biological Sciences* 3, 13. See also Chunglin Kwa, 'The Rise and Fall of Weather Modification: Changes in American Attitudes Toward Technology, Nature, and Science' in Clark A Miller and Paul N Edwards (eds), *Changing the Atmosphere: Expert Knowledge and Environmental Governance* (The MIT Press, 2001) 135, 157. According to Kwa, the United States Department of Defense spent USD$21.6 million on weather modification along the Ho Chi Minh trail.

[130] See United Nations, *The United Nations and Disarmament 1970-1975*, (United Nations Publication, 1976) 191–9. For contemporaneous discussion of the need for a treaty to regulate weather modification for military purposes, see J W Samuels, 'International Control of Weather Modification Activities: Peril or Policy?' in Ludwik A Teclaff and Albert E Utton (eds), *International Environmental* Law (Praeger Publishers, 1974) 199. See also Fleming, above n 129, 14. Fleming suggests that the negotiation of the *ENMOD Convention* was triggered by the United States' use of cloud seeding along the Ho Chi Minh trail, which became public knowledge in 1971.

attempts to manipulate the atmosphere on a larger scale, such as SAI.[131] However, the preamble to the *ENMOD Convention* clearly distinguishes the 'hostile' use of environmental modification techniques from non-military uses, recognising that:

> [T]he use of environmental modification techniques for peaceful purposes could improve the interrelationship of man and nature and contribute to the preservation and improvement of the environment for the benefit of present and future generations.

The *ENMOD Convention* therefore does not prohibit the use of SAI if carried out for non-hostile (i.e. 'peaceful') purposes.

1.2.2 The climate change regime

The governance of SAI is currently beyond the scope of the international climate change regime. The 1992 *United Nations Framework Convention on Climate Change* (UNFCCC) and associated agreement, including the 1997 *Kyoto Protocol* and the 2015 *Paris Agreement*, form a comprehensive regime for international climate change governance. The scope of this regime is currently limited to climate change mitigation, adaptation and procedural mechanisms, such as finance and reporting. General provisions under the *UNFCCC* may be indirectly relevant to future attempts at SAI, such as the obligation to protect the climate system and the precautionary principle under article 3.[132] The recently concluded *Paris Agreement* contains an oblique reference to CDR geoengineering, acknowledging in article 4 a need to 'achieve a balance between anthropogenic emissions by sources and removals by sinks of greenhouse gases in the second half of this century'.[133] However, there are no provisions within the *Paris Agreement* or the broader *UNFCCC* regime that would enable it to expressly govern SAI proposals.[134] It certainly does not prohibit SAI, but nor does it provide clear guidance as to how environmental risks and uncertainties should be addressed.

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[131] See Ralph Bodle, 'Geoengineering and International Law: The Seach for Common Legal Ground' (2010-2011) 46 *Tulsa Law Review* 305, 312.

[132] See Albert C Lin, 'International Legal Regimes and Principles Relevant to Geoengineering' in Wil C G Burns and Andrew L Strauss (eds), *Climate Change Geoengineering- Philosophical Perspectives, Legal Issues, and Governance Frameworks* (Cambridge University Press, 2013) 182, 184. According to Lin, the extent to which geoengineering techniques would support obligation to protect the climate system under the *UNFCCC* is debateable, given the risk of adverse side effects.

[133] *Paris Agreement*, opened for signature 12 December 2016 (entered into force 4 November 2016) < http://unfccc.int/paris_agreement/items/9485.php>.

[134] See also Karen N Scott, 'International Law in the Anthropocene: Responding to the Geoengineering Challenge ' (2013) 34 *Michigan Journal of International Law* 309, 330-331. Scott also notes that, with the exception of afforestation and reforestation the *UNFCCC* and *Kyoto Protocol* do not explicitly address CDR geoengineering.

1.2.3 The ozone regime

The potential for future attempts at SAI to further deplete the stratospheric ozone layer potentially brings it within the scope of the Ozone Regime. Under article 2 of the *Vienna Convention for the Protection of the Ozone Layer* (*Ozone Convention*), states have a general obligation to 'take appropriate measures…to protect human health and the environment against adverse effects resulting or likely to result from human activities which modify or are likely to modify the ozone layer.'[135] The *Montreal Protocol to the Vienna Convention for the Protection of the Ozone Layer*[136] (*Montreal Protocol*) establishes specific, binding legal obligations concerning the production and consumption of expressly listed ozone-depleting substances.[137] Both the *Ozone Convention* and *Montreal Protocol* have universal membership,[138] giving these agreements the theoretical capacity to respond to the future SAI activities of *any* state. However, sulphate aerosols – the most popular proposed substance for SAI that has the potential to interact with ozone molecules – are not listed under the Montreal Protocol.[139] Lin suggests that 'given the potential for stratospheric aerosols to undermine the fundamental objective of the Protocol, the parties to the Protocol would likely take action to address geoengineering projects that involve the release of stratospheric aerosols.'[140] Nevertheless, as it currently stands, it is unlikely that the *Ozone Regime* would respond to future attempts at SAI.

1.2.4 The 1979 Convention on Long-Range Transboundary Air Pollution (LRTAP)

The *LRTAP Convention* is a regional agreement aimed at limiting transboundary air pollution.[141] Under article 2, parties to the agreement are to 'to protect man and his environment against air pollution and shall endeavour to limit and, as far as possible, gradually reduce and prevent air pollution including long-range transboundary air pollution.' Air pollution is broadly defined under article 1 as:

> [T]he introduction by man, directly or indirectly, of substances or energy into the air resulting in deleterious effects of such a nature as to endanger human health, harm living resources and

[135] *Vienna Convention for the Protection of the Ozone Layer*, opened for signature 22 March 1985, 1513 UNTS 293 (entered into force 22 September 1988) ('*Ozone Convention*').
[136] *Montreal Protocol on substances that Deplete the Ozone Layer*, opened for signature 16 September 1987, [1989] ATS 18 (entered into force 1 January 1989).
[137] Sands and Peel, above n 3, 265.
[138] See *Treaties and Decisions*, Ozone Secretariat <http://ozone.unep.org/en/treaties-and-decisions>.
[139] Lin, above n 132, 196.
[140] Ibid.
[141] *Convention on Long-range Transboundary Air Pollution*, opened for signature 13 November 1979, 1302 UNTA 217 (entered into force 16 March 1983) ('*LRTAP*').

> ecosystems and material property and impair or interfere with amenities and other legitimate uses of the environment.

The term 'long-range transboundary air pollution' refers to air pollution that crosses from the jurisdiction of one state into another 'at such a distance that it is not generally possible to distinguish the contribution of individual emission sources or groups of sources.'[142] These definitions are sufficiently broad enough to bring SAI within the general scope of the *LRTAP Convention*. Of further relevance to SAI are two additional protocols to the *LRTAP Convention* that expressly deal with sulphur emissions: the 1985 protocol on the *Reduction of Sulphur Emissions or Their Transboundary Fluxes by at Least 30 Per Cent*[143] and the 1994 *Oslo Protocol on Further Reduction of Sulphur Emissions.*[144] Parties to these additional protocols have obligations to limit their sulphur emissions, which could be potentially relevant should SAI be conducted using sulphate aerosols.[145]

Nevertheless, there is a number of factors that limit the potential of the *LRTAP Convention* to contribute to the governance of SAI. The first issue is membership. The membership of the *LRTAP Convention* is regional – mostly European states with the exception of Canada and the United States. It therefore would not be able to respond to geoengineering activities that may be conducted by non-member states (i.e. states in South-East Asia, Oceania, Africa and South America).[146] Furthermore, not all Parties to the Convention are party to the 1985 and 1994 additional protocols. The United States – a state which has recently shown interest in the development of SRM/SAI[147] - has not signed or ratified either protocol.[148] Additionally, the quantity of sulphur emissions from future attempts at SAI may not be enough to trigger

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[142] *LRTAP*, art 1.
[143] *Protocol to the 1979 Convention on Long-Rang Transboundary Air Pollution on the Reduction of Sulphur Emissions or Their Transboundary Fluxes by at Least 30 Per Cent*, opened for signature 8 July 1985, 1480 UNTS 215 (entered into force 2 September 1987).
[144] *Protocol to the 1979 Convention on Long-Rang Transboundary Air Pollution on the Further Reduction of Sulphur Emissions*, opened for signature 14 June 1994, 2030 UNTS 122 (entered into force 5 August 1998).
[145] For further discussion, see Lin, above n 132, 195.
[146] See also David A Wirth, 'Engineering the Climate: Geoengineering as a Challenge to International Governance' (2013) 40(2) *Boston College Environmental Affairs Law Review* 413, 436.
[147] In 2016, a spending bill was proposed in the US Senate to study the potential of SRM as a response to climate change. See Adrian Cho, 'To fight global warming, Senate calls for study of making the Earth reflect more light' Science (19 April 2016) <http://www.sciencemag.org/news/2016/04/fight-global-warming-senate-calls-study-making-earth-reflect-more-light>
[148] See *Protocol to the 1979 Convention on Long-Rang Transboundary Air Pollution on the Reduction of Sulphur Emissions or Their Transboundary Fluxes by at Least 30 Per Cent*, United Nations Treaty Collection, < https://treaties.un.org/Pages/ViewDetails.aspx?src=TREATY&mtdsg_no=XXVII-1-b&chapter=27&clang=_en >; *Protocol to the 1979 Convention on Long-Rang Transboundary Air Pollution on the Further Reduction of Sulphur Emissions*, United Nations Treaty Collection, <https://treaties.un.org/Pages/ViewDetails.aspx?src=TREATY&mtdsg_no=XXVII-1-e&chapter=27&clang=_en>.

obligations under these protocols.[149] The *LRTAP Convention* therefore has limited capacity to respond to future attempts at SAI.

1.2.5 Other international agreements

Efforts towards governing geoengineering technology have been made under some international agreements, but these do not adequately respond to the risks of SAI. Since 2008, there have been developments in other treaty regimes specifically directed at governing the CDR geoengineering technique of ocean fertilisation. These developments were largely triggered by private sector interest in developing ocean fertilisation technology so as to generate carbon credits for trading purposes.[150] According to Ginzkey and Frost, proposed OIF activities by United States company Planktos Incorporated triggered the Contracting Parties to the *Convention on the Prevention of Marine Pollution by Dumping of Wastes and Other Matter ('London Convention')*[151] and the *1996 Protocol* (*'London Protocol')*[152] to consider the international regulation of ocean fertilisation geoengineering.[153] In 2008[154] and 2010[155], the Contracting Parties to the *London Convention* and *London Protocol* passed non-binding resolutions that encouraged the development of an effective control and regulatory mechanism for ocean fertilization activities.[156] In 2013, parties to the *London Protocol* adopted resolution LP.4(8) to amend the *London Protocol* to including legally binding provisions for the

[149] Lin, above n 132, 195-196;
[150] A prominent example is United States based company Planktos Incorporated. See, Rachel Courtland, 'Planktos dead in the water', *Nature* (online) 15 February 2008 <http://www.nature.com/news/2008/080215/full/news.2008.604.html>.
[151] *Convention on the Prevention of Marine Pollution by Dumping of Wastes and Other Matter*, opened for signature 29 December 1972, 1046 UNTS 138 (entered into force 30 August 1975).
[152] *1996 Protocol to the 1972 Convention on the Prevention of Marine Pollution by Dumping of Wastes and Other Matter*, opened for signature 7 November 1996, [2006] ATS 11 (entered into force 24 March 2006).
[153] See Harald Ginzkey and Robyn Frost, 'Marine Geo-Engineering: Legally Binding Regulation under the London Protocol ' (2014) 8(2) *Carbon and Climate Law Review* 82, 83.
[154] *Resolution LC-LP 1(2008) on the Regulation of Ocean Fertilization*, LC30/16 (adopted 31 October 2008) < http://www.imo.org/blast/blastDataHelper.asp?data_id=24337&filename=LC-LP1(30).pdf>. This Resolution recognised that ocean fertilization activities fall within the scope of the *London Convention* and *Protocol* (at [1]). Contracting Parties also agreed that ocean fertilization activities for purposes other than 'legitimate scientific research' should not be conducted, due to the limited understanding of these technologies (at [8]). See also ibid, 83. Ginzkey and Frost note that this resolution closely follows decision IX/16 under the *Convention on Biological Diversity*, opened for signature 5 June 1992, 1760 UNTS 79 (entered into force 29 December 1993) ('*CBD'*).
[155] *Resolution LC-LP.2 (2010) on the Assessment Framework for Scientific Research Involving Ocean Fertilization*, LC 32/15 (adopted 13 October 2010). Under this resolution, the Contracting Parties adopted a non-binding framework to evaluate whether a proposed ocean fertilization activity constitutes a 'legitimate scientific activity' (at 2 [1]).
[156] For an historical overview of the regulation of marine geoengineering under the *London Convention* and *London Protocol* see Ginzkey and Frost, above n 153. See also International Maritime Organization, *Marine Geoengineering* <http://www.imo.org/en/OurWork/Environment/LCLP/EmergingIssues/geoengineering/Pages/default.aspx>.

regulation of marine geoengineering activities.[157] However, SAI is not within the scope of these amendments.

In 2008[158] and 2010,[159] the issue of geoengineering was similarly considered by state parties to the *Convention on Biological Diversity (CBD).*[160] The 2010 Conference of the Parties decision X/33 is of most relevance to SAI.[161] X/33 effectively called for a moratorium on *all* geoengineering activities (including SAI), until there is adequate scientific understanding and governance mechanisms in place. The only exception to this moratorium are:

> [S]mall scale scientific research studies that would be conducted in a controlled setting in accordance with Article 3 of the Convention, and only if they are justified by the need to gather specific scientific data and are subject to a thorough prior assessment of the potential impacts on the environment.[162]

However, as noted by Scott, while this COP decision may be persuasive, it is non-binding.[163] This development therefore does not provide adequate governance for SAI.

1.3 UNDERSTANDING THE ROLE OF THE NO-HARM RULE IN INTERNATIONAL ENVIRONMENTAL GOVERNANCE: AN INTERDISCIPLINARY APPROACH

The above analysis demonstrates that existing international agreements would not adequately respond to future attempts at SAI. In recognition of this gap in international law, researchers have proposed the development of specific governance mechanisms to address the risks and governance challenges of geoengineering research and future deployment, including SAI.[164] These proposals range from the development of formal international institutions[165] to self-

[157] *Resolution LP.4(8): On the Amendment to the London Protocol to Regulate the Placement of Matter for Ocean Fertilization and other Marine Geoengineering Activities, LC 35/15* (adopted 18 October 2013).
[158] *Decision adopted by the Conference of the Parties to the Convention on Biological Diversity at its Ninth Meeting, IX/16 Biodiversity and climate change, C. Ocean Fertilization*, 9th mtg , Agenda Item 4.5, UNEP/CBD/COP/DEC/IX/16 (9 October 2008) <https://www.cbd.int/doc/decisions/cop-09/cop-09-dec-16-en.pdf>.
[159] *Decision adopted by the Conference of the Parties to the Convention on Biological Diversity at its Tenth Meeting x/33, Biodiversity and Climate Change*, 10th mtg, Agenda Item 5.6, UNEP/CBD/COP/DEC/X/33 (29 October 2010) paragraph 8(w) ('*Decision X/33*'). See also, Scott, above n 134, 332. Scott notes that this decision is sometimes referred to as a moratorium on geoengineering, however, this is incorrect because it is non-binding.
[160] *CBD*.
[161] *Decision X/33*. See also, Scott, above n 134, 332. Scott notes that this decision is sometimes referred to as a moratorium on geoengineering, however, this is incorrect because it is non-binding.
[162] *Decision X/33*.
[163] Scott, above n 134, 332.
[164] See, eg Anna-Maria Hubert, Tim Kruger and Steve Rayner, 'Geoengineering: Code of conduct for geoengineering' (2016) 537(7621) *Nature* 488; Hubert and Reichwein, above n 24.
[165] See Wirth, above n 146, 437.

imposed standards or moratoria to be voluntarily adopted by scientists.[166] While these proposals have contributed to growing discussions on geoengineering governance, they have not yet led to the negotiation of international governance mechanisms for SAI. Until such a development takes place, if international law is to play a role in governing SAI it must be through existing rules of customary international law. This raises the question: *what role might the no-harm rule play in governing future attempts at SAI?*

Work on this project has coincided with a renewal of interest in international environmental law scholarship on the no-harm rule and its potential to respond to international environmental issues that are beyond the scope of existing treaty law. For example, in 2011, the President of the small Pacific Island developing state of Palau called for the International Court of Justice to provide an advisory opinion on the potential application of the no-harm rule to the issue of climate change damage.[167] In 2013, the International Law Commission commenced a new project on international law for the protection of the atmosphere, which includes detailed consideration of the potential of the no-harm rule to respond to threats of harm to the atmosphere.[168] Renewed scholarly interest in the no-harm rule has also been fuelled by increased consideration of the no-harm rule by international courts and tribunals in recent disputes. Since 2010, the no-harm rule as a principle of customary international law has been considered in three disputes before the International Court of Justice.[169] Two cases have also been brought before the International Tribunal for the Law of the Sea Convention and the

[166] See, Parson and Keith, above n 18. See also, Asilomar Scientific Organising Committee, 'The Asilomar Conference Recommendations on Principles for Research into Climate Engineering Techniques' (Conference Report, Asilomar Scientific Organising Committee, November 2010) <http://www.climate.org/PDF/AsilomarConferenceReport.pdf> ('Asilomar Principles'); Steve Rayner et al, 'The Oxford Principles' in The Regulation of Geoengineering, House of Commons, Science and Technology Committee, Fifth Report of Session 2009-2010 (2010) Ev42-Ev44 ('Oxford Principles'); 'The Berlin Declaration' *Climate Engineering Conference 2014* <http://ce-conference.org/draft-statements>. The Berlin Declaration was put forward for consideration at the 2014 climate engineering conference in Berlin. It was dismissed by participants and eventually withdrawn by the proposers. For further analysis see Andy Parker, *Reflecting on the "Berlin Declaration"*, (16 July 2015) Forum for Climate Engineering Assessment <http://ceassessment.org/reflecting-on-the-berlin-declaration-andy-parker-with-oliver-morton-and-george-collins/>.

[167] 'H.E. Mr. Johnson Toribiong, President of Palau Statement Summary of the 22nd September 2011', General Assembly of the United Nations, <https://gadebate.un.org/en/66/palau>; See also Stuart Beck and Elizabeth Burleson, 'Inside the System, Outside the Box: Palau's Pursuit of Climate Justice and Security at the United Nations' (2014) 3(01) *Transnational Environmental Law* 17.

[168] See Shinya Murase, 'Third report on the protection of the atmosphere', Protection of the Atmosphere, International Law Commission, 68th sess, UN Doc A/CN.4/692 (2 May-10 June and 4 July-12 August 2016), 6-20.

[169] *Pulp Mills on the River Uruguay (Argentina v Uruguay)(Judgment)* [2010] ICJ Rep 14; *Aerial Herbicide Spraying (Ecuador v Colombia) (Order of 13 September 2013)* [2013] ICJ Rep 278; *Certain Activities Carried Out by Nicaragua in the Boarder Area (Costa Rica v Nicaragua) & Construction of a Road in Costa Rica Along the San Juan River (Nicaragua v Costa Rica) (Judgment)* (International Court of Justice, General List No 150 & 152, 16 December 2015).

Permanent Court of Arbitration that consider articles 192 and 194 under *the United Nations Convention on the Law of the Sea* (‘*UNCLOS’*).[170] These articles embed the no-harm rule within *UNCLOS*. Leading international environmental law scholar Jutta Brunnée has described this recent surge in disputes as a ‘renaissance’ of the no-harm rule.[171]

This research contributes to this renaissance by considering the content of the no-harm rule in light of recent developments in international case law, but it also aims to extend the renaissance of the no-harm rule beyond legal doctrinal scholarship. Legal doctrinal scholarship provides an important understanding of the content of the no-harm rule and how it might be interpreted to apply to specific scenarios, such as future attempts at SAI. However, it leaves unanswered key questions regarding the wider role of the no-harm rule in international environmental governance. Reflecting on the meaning of governance outlined above, understanding the content of the no-harm rule is not the same as understanding its potential to steer or guide international society towards socially desirable outcomes. It does not explain why the no-harm rule is invoked in some international disputes, but not in others. It does not shed light on the capacity of the no-harm rule to influence the decision-making of key international actors. Finally, doctrinal legal analysis does not provide a framework for exploring how the no-harm rule might be developed to enhance its contribution to international environmental governance.

Research on the no-harm rule from other disciplinary perspectives is therefore needed to address these questions and thereby realise the potential of the no-harm rule to govern future attempts at SAI. Answering these question will help to predict how the no-harm rule is likely to influence the decision-making of key actors (especially states) to prevent any future attempts at SAI from having significant detrimental side effects on the global environment. Different approaches are also needed to suggest how the no-harm rule be developed to better achieve this objective. This is where international relations theories on compliance with international law can make an important contribution. International relations theories can complement doctrinal analysis by explaining how and why the no-harm rule is likely to shape the behaviour of state and non-state actors when it comes to future attempts at SRM. They can also provide a fresh perspective on the capacity of the no-harm rule to contribute to broader issues in international environmental governance, such as the protection of the atmosphere.

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[170] *Responsibilities and Obligations of States Sponsoring Persons and Entities with Respect to Activities in the Area (Advisory Opinion)*, [2011] ITLOS Reports 10; *The South China Sea Arbitration (Philippines v China) (Awards)* (Permanent Court of Arbitration, Case No 2013-19, 12 July 2016).

[171] Jutta Brunnée, 'The Sources of Interactional Environmental Law: Interactional Law ' in Samantha Besson and d'Aspremont (eds), *Oxford Handbook on the Sources of International Law* ((2017) Forthcoming) 1.

As a discipline, international relations is a broad church. There are numerous approaches within this discipline for considering the way in which norms (including legal rules) facilitate international governance and promote compliance by influencing the behaviour of state and/or non-state actors. International relations theories on compliance can be divided into two main categories. The first category are theories that follow the 'logic of expected consequence'.[172] Theories in this category privilege the role of states in international governance. States are characterised as rational, self-interested and utilitarian actors that are driven by a desire to maximise future gains and/or minimise future losses. Simply speaking, in this view legal rules contribute to international governance by modifying a state's expectations of future gains or losses. Such interests may include power, financial, or reputational interests.[173] The second broad category of theories are those that follow the 'logic of appropriateness.'[174] These approaches are non-utilitarian. Logic of appropriateness theories generally consider the role of both state and non-state actors in international governance. They characterise actors as being motivated and shaped by norms themselves.[175] Broadly speaking, these theories recognise that actors follow norms, including legal rules, because they perceive them to be acceptable, authoritative or legitimate.[176] In other words, actors comply with international law because it is the 'right thing to do' and not because of utilitarian calculations.[177]

This project uses Brunnée and Toope's theory of interactional international law to assess the potential role of the no-harm rule to contribute to the international governance of SAI. Interactional law theory explains the operation of legal rules and the international law system through the logic of appropriateness. This approach is used in this project instead of 'logic of consequence' theories. A detailed explanation for selecting this theory is provided in chapter three. For the purpose of this introduction, it is sufficient to note that the inherent uncertainties involved in conducting SAI, such as the potential for unknown side-effects and the difficulty in predicting regional impacts, are likely to limit the capacity for utilitarian decision-making based on a cost-benefit analysis.[178] Whether states are likely to comply with the no-harm rule

[172] James G. March and Johan P. Olsen, 'The Institutional Dynamics of International Political Orders' (1998) 52(4) *International Organization* 943, 949.
[173] See, eg, Jack J Goldsmith and Eric A Posner, *The Limits of International Law* (Oxford University Press, 2007); Guzman, above n 31. This is discussed further in Chapter 3.
[174] March and Olsen, above n 172, 951.
[175] Ibid, 951.
[176] Young and Levy, above n 33, 23-34.
[177] Ibid, 24; March and Olsen, above n 172, 951.
[178] Oran R Young, 'Does fairness matter in international environmental governance? Creating an effective and equitable climate regime ' in Todd L Cherry, Jon Havi and David M McEvoy (eds), *Towards a New Climate Agreement: Conflict, Resolution and Governance* (Routledge 2014) 16, 18-19.

in the event of future attempts at SAI will therefore more likely be driven by the 'logic of appropriateness'. Interactional law theory follows the logic of appropriateness. It draws on constructivist international relations theories and the procedural natural law theory of Lon L Fuller[179] to explain the role and creation of 'legal obligation'. This is a sense of legal legitimacy and fidelity to international law that exerts a 'compliance pull' on state and non-state actors.[180]

Interactional law theory is a relatively new approach. Aside from Brunnée and Toope's use of this theory, it has not been widely considered or applied by other law or international relations scholars.[181] This project therefore provides an opportunity to consider the efficacy and function of this theory. In applying interactional law theory to the no-harm rule, this project also seeks to test the theory's utility as an approach for assessing the role of customary legal norms in international environmental governance and how they might be developed to increase the likelihood of compliance. It is also hoped that the application of interactional law theory in this project will stimulate consideration of the role of the no-harm rule in international environmental governance beyond the field of legal doctrinal scholarship, encouraging international relations and governance scholars to turn their attention to the role of the no-harm rule and customary international law in international environmental governance.

1.4 THESIS STRUCTURE

This project is organised into ten chapters. Chapter two examines the current state of analysis of the no-harm rule in legal literature and in geoengineering literature more specifically. Chapter three establishes the research design of the project. It sets out specific research questions and explains how doctrinal legal analysis and interactional law theory are used to address those questions. Chapters four, five and six examine the content of the no-harm rule. As a principle of customary international law, the content of the no-harm rule has continued to evolve over time. These chapters therefore take an historic approach to establishing the content of the no-harm rule, analysing the development of the no-harm rule through key sources from the 1938/1941 *Trail Smelter Arbitration* to the present day. The understanding of the no-harm rule developed in these chapters is then applied to SAI proposals in chapter seven. As SAI

[179] Lon L Fuller, *The Morality of Law- Revised Edition* (Yale University Press, 1969).
[180] Brunnée and Toope, above n 34, 113.
[181] The exception to this are several articles that discuss interactional international law theory published in a special edition of *International Theory* in 2011 (volume 3 issue 2). See Martti Koskenniemi, 'The mystery of legal obligation' (2011) 3(02) *International Theory* 319; Jeffrey L. Dunoff, 'What is the purpose of international law?' (2011) 3(2) *International Theory* 326; Christian Reus-Smit, 'Obligation through practice' (2011) 3(02) *International Theory* 339.

remains conceptual, having not yet been field tested in the atmosphere, Chapter seven uses a series of hypothetical scenarios to give weight to this analysis. Chapter eight applies interactional law theory to the no-harm rule to assess the likelihood that states will comply with it when it comes to future attempts at SAI. Chapter nine synthesises the findings from doctrinal legal analysis and the application of interactional law theory and reflects on the overall capacity of the no-harm rule to govern the risks of SAI. It recommends how the no-harm rule might be developed to strengthen its capacity to respond to risks of harm to the atmosphere posed by SAI. Chapter ten concludes this project and flags directions for future research.

2 The Current State of Analysis of the No-Harm Rule in Geoengineering Literature

Parts of this chapter are published in Kerryn Brent, Jeffrey McGee, and Amy Maguire, 'Does the 'No-Harm' Rule Have a Role in Preventing Transboundary Harm and Harm to the Global Atmospheric Commons from Geoengineering?' (2015) 5(1) *Climate law* 35. Permission has been granted from the editor to reproduce sections of this article in this chapter (See appendix 2).

Chapter one demonstrated that existing international agreements do not adequately respond to the potential risks of environmental harm posed by SAI. Until such time as an existing agreement is amended or a new agreement negotiated to specifically address SAI, the primary means through which international law can respond to these risks is through existing rules of customary international law. The no-harm rule appears promising in this regard. The potential for the impacts of SAI to transcend state borders and affect the territory of other states and the atmosphere *per se* may give rise to obligations under the no-harm rule.

This chapter considers the extent to which existing scholarship has examined the potential of the no-harm rule to contribute to the governance of SAI. It highlights three different approaches. The first approach in geoengineering literature is an assumption that there are no binding rules of international law that exist or that apply to SAI that might limit the freedom of states to engage in SAI. The second approach is literature that recognises the potential relevance of the no-harm rule but downplays its potential to contribute to the international governance of SAI. This is typically because of a perceived lack of clarity regarding the content of the no-harm rule or concerns regarding the capacity for the no-harm rule to be enforced against states that do not comply. The third approach is literature that primarily considers the no-harm rule as the basis of a claim for state liability and compensation for harm *after* it has been caused – that is, as a potential mechanism to hold states responsible under international law for transboundary harm that might result from future attempts at SAI.

This survey of geoengineering literature highlights a common gap. These approaches suggest that there is limited understanding of the potential of the no-harm rule to contribute to the governance of SAI. Specifically, there is little understanding of how the no-harm rule might operate to influence the behaviour of states in order to *prevent* transboundary harm and harm to the global commons from occurring. Existing literature further highlights a need to clarify the content of the no-harm rule and how it might apply to SAI. It also calls into question long-

standing assumptions in legal literature as to the relationship between the legally binding status and enforceability of 'hard' legal norms and compliance with them. Overall, the way in which SAI has been considered in geoengineering literature so far underscores the need to reconsider and better communicate the contemporary role of the no-harm rule in international environmental governance.

This chapter examines each approach in geoengineering literature respectively in sections 2.1, 2.2 and 2.3. Section 2.4 focuses on the gaps in these approaches and in our understanding of the role of the no-harm rule in international environmental governance.

2.1 APPROACH NUMBER 1: INTERNATIONAL LAW DOES NOT PROHIBIT SAI

The first approach in geoengineering literature is the broad assumption that international law would not prohibit or otherwise curtail future attempts at geoengineering. The previous chapter drew attention to a statement by Barrett, who said that 'countries are more or less free to do what they want' when it comes to future attempts at geoengineering.[1] In a 2013 article in the leading journal *Science*, geoengineering proponents Parson and Keith claimed that geoengineering 'falls under no international legal control', including both small-scale field tests and full-scale deployment.[2] These examples are broad and refer to both CDR and SRM geoengineering proposals. However, they give the impression that there are currently no mechanisms under international law that have the capacity to govern future attempts at SAI. It is true that international treaty law is unlikely to adequately respond to field testing or full-scale deployment of SAI.[3] However, these claims do not appear to take into account customary international law. In particular, the way in which the risks of transboundary harm and harm to the atmosphere posed by SAI are likely to give rise to obligations under the no-harm rule.

The implication that there is no international law for the governance of SAI is reinforced by the inadequate treatment given to customary international law in early interdisciplinary reports on geoengineering governance. For example, in 2009, the Royal Society published the first comprehensive report on the science and governance of CDR and SRM geoengineering.[4] This

[1] As quoted in Michael Marshall, 'Geoengineers are free to legally hack the climate' *New Scientist*, (1 November 2013) <https://www.newscientist.com/article/mg22029413-800-geoengineers-are-free-to-legally-hack-the-climate/>.
[2] Edward A Parson and David W Keith, 'End the Deadlock on Governance of Geoengineering Research' (2013) 339(6125) *Science* 1278, 1278.
[3] See chapter 1.2.
[4] The Royal Society, 'Geoengineering the climate: science, governance and uncertainty ' (The Royal Society 2009)('*Royal Society Report*'). The Royal Society is a fellowship of the world's most distinguished scientists based in the UK. In 2009 the Royal Society brought together experts from different fields, including climate and

report presents mixed messages concerning the capacity of international law to respond to geoengineering proposals. According to this report:

> At present international law provides a *largely permissive framework* for geoengineering activities under the jurisdiction and control of a particular state, so long as those activities are limited in their scope and effects to that state's territory.[5] (emphasis added)

The report then goes on to give a brief overview of the no-harm rule.[6] It mentions that geoengineering activities may give rise to the duty not to cause significant transboundary harm.[7] However, it does not expressly identify this as a rule of customary international law, nor does it explain that as a principle of customary international law it is binding on all states. The 2011 report by the Solar Radiation Governance Initiative similarly flags the no-harm rule as a principle of customary international law, but does not explain what this term means.[8] The target audience for these reports are interdisciplinary – many readers would be unfamiliar with the meaning of customary international law, or aware that it has equal status to binding treaty rules and applies to all states. The status of the no-harm rule as a binding principle of customary international law is significant because traditional doctrinal approaches to international law assume that the binding status of rules enhances the influence they have over states, and hence the likelihood of compliance.[9] Greater explanation is needed to convey the status and operation of the no-harm rule as a principle of customary international law, especially to audiences that are predominantly without expertise in international law.

The assumption that there are no rules of international law that govern SAI is further bolstered by some suggestions that existing rules of international law actively *encourage* the development of geoengineering technology. According to Reynolds, multilateral environmental agreements favour field testing of geoengineering, including SAI because the development of geoengineering is intended to address the risks of climate change damage.[10] Reynolds states that 'commitments to protect the environment often imply that States should

environmental science, engineering and law to provide a comprehensive assessment of the most prominent SRM and CDR geoengineering proposals (at v).

[5] Royal Society Report, above n 4, 40.

[6] Ibid.

[7] Ibid.

[8] Solar Radiation Governance Initiative, *Solar radiation management: the governance of research* (2011) <http://www.srmgi.org/report/> 31 ('*SRMGI Report*').

[9] Brian D Lepard, *Customary International Law- A New Theory with Practical Applications* (Cambridge University Press, 2010) 99. See also Harold Hongju Koh, 'Why Do Nations Obey International Law?' (1997) 106 *Yale Law Journal* 2599, 2608; Daniel Bodansky, 'The who, what, and wherefore of geoengineering governance' (2013) 121(3) *Climatic Change* 539, 542.

[10] Jesse Reynolds, 'Climate Engineering Field Research: The Favorable Setting of International Environmental Law' (2014) 5 *Washington and Lee Journal of Energy, Climate, and the Environment* 417, 419.

consider innovative actions such as climate engineering in order to do so.'[11] Reynolds recognises that under the no-harm rule states may have a duty of due diligence to prevent significant transboundary harm from future geoengineering activities and a duty to cooperate with other potentially affected states to minimise risks of transboundary harm.[12] However, he implies that there may be conflict in the application of this rule between the need to prevent harm from geoengineering versus the need to develop technology to prevent significant harm from climate change.[13]

Reynolds is not alone in highlighting potential conflict between the duty to prevent harm from geoengineering and the duty to prevent harm from climate change. Bodansky makes a similar comment with regards to the no-harm rule and geoengineering, noting that it is unclear how the no-harm rule would apply as 'geoengineering is intended to prevent rather than cause environmental harm.'[14] Scott also suggests that the risks of climate change may need to be taken into account when evaluating the risks of future attempts at geoengineering.[15] These comments raise questions about the content of the no-harm rule and how it should be interpreted to apply to the risks posed by SAI. However, the proposition that geoengineering may be necessary to *fulfil* international obligations to prevent climate change damage reinforces broader claims that there is currently no international law to respond to the risks posed by SAI.

2.2 APPROACH NUMBER 2: THE NO-HARM RULE IS UNCLEAR AND UNENFORCEABLE

The second approach in geoengineering literature recognises the potential relevance of the no-harm rule to geoengineering proposals, including SAI, but downplays its capacity to contribute to geoengineering governance. This characterisation of the no-harm rule is typically found in articles that conduct broad surveys of legal rules (treaty and customary) and non-binding principles (notably the precautionary principle) that may be relevant to geoengineering

[11] Reynolds, above n 10, 430.
[12] Ibid, 476-477. A detailed explanation of the duty of due diligence under the no-harm rule, including the duty to consult and notify with potentially affected states is provided in chapter 6.
[13] Ibid, 477.
[14] Daniel Bodansky, 'Governing Climate Engineering: Scenarios for Analysis' (2011) 47(11) *Harvard Project on Climate Agreements Discussion Paper* 1, 15.
[15] Karen N Scott, 'International Law in the Anthropocene: Responding to the Geoengineering Challenge ' (2013) 34 *Michigan Journal of International Law* 309, 335.

proposals.[16] Such accounts of the no-harm rule tend to be brief (between several paragraphs and several pages), and consider the relevance of the no-harm rule in the context of geoengineering proposals more broadly, rather than just SAI. As such, they do not engage in a detailed analysis of content of the no-harm rule and its potential to respond to specific risks posed by SAI.

The first reason why the capacity of the no-harm rule is downplayed by some scholars is that they perceive its content to be unclear. That is, the scope of the rule (i.e. what activites the no-harm rule applies to) and/or the standard of care that states must meet to fulfil their obligations in accordance with it is not clear. For example, Bodansky suggest that the no-harm rule, like other general rules of international law, is unlikely to directly constrain any future attempts at geoengineering because its content is too vague.[17] That is, it does not provide specific guidance to states as to how they should proceed with geoengineering.[18] Bodansky[19] and Lin[20] further suggest that it is uncertain whether future attempts at geoengineering will meet the threshold of 'significant' harm, which is necessary to give rise to obligations under the no-harm rule.[21] Both authors suggest that the no-harm rule may provide a frame of reference from which states can debate geoengineering governance at best, but that it is unlikely to constrain any future attempts at geoengineering, including SAI, in the rule's present form.[22]

Claims that the content of the no-harm rule is too vague or uncertain to respond directly to the risks of SAI do not match with accounts of the no-harm rule in legal literature. There is a wealth of contemporary legal analysis that provides detailed interpretations of the content of the no-harm rule and demonstrates that the content of the no-harm rule can be identified and interpreted with –sufficient clarity to apply it to specific environmental problems. This body of legal literature suggests that the potential of the no-harm rule to contribute to the governance of SAI should not be downplayed for reasons of clarity. For example, Lefeber provides a

[16] See eg, Daniel Bodansky, 'May we engineer the climate?' (1996) 33(3) *Climatic Change* 309; Albert C Lin, 'International Legal Regimes and Principles Relevant to Geoengineering' in Wil C G Burns and Andrew L Strauss (eds), *Climate Change Geoengineering- Philosophical Perspectives, Legal Issues, and Governance Frameworks* (Cambridge University Press, 2013) 182; Ralph Bodle, 'Geoengineering and International Law: The Seach for Common Legal Ground' (2010-2011) 46 *Tulsa Law Review* 305.
[17] Bodansky, 'May we engineer the climate?', above n 16, 313; Bodansky, 'The who, the what, and wherefore of geoengineering governance', above n 9, 542.
[18] Bodansky, 'May we engineer the climate?', above n 16, 313; Bodansky, 'The who, the what, and wherefore of geoengineering governance', above n 9, 542.
[19] Bodansky, 'May we engineer the climate?', above n 16, 312.
[20] Lin, above n 16, 198. According to Lin, the applicability of the no-harm rule will likely 'depend on the amount of harm resulting from a geoengineering project and the degree of care taken by the responsible state.'
[21] This threshold is dicussed in chapter 7.3.3.
[22] Bodansky, 'May we engineer the climate?', above n 16, 313; Lin, above n 16, 199.

detailed analysis of the content of the duty to prevent transboundary harm to states with respect to the planning, operational and termination phases of activities,[23] although the scope of his analysis is restricted to harm or 'interference' caused to the territory of states and not to the global commons.[24] Hanqin's comprehensive study of transboundary harm in international lawaddresses the issue of harm to the global commons,[25] and Verheyen analyses the no-harm rule in the context of climate change damage.[26] In particular, Verheyen examines the issue of standard of care and how this might translate to real-life situations.[27] Finally, McIntyre analyses how the no-harm rule might apply in the context of the protection of shared international freshwater resources.[28]

The capacity of the no-harm rule to respond to geoengineering is also downplayed due to concerns regarding enforcement. Bodle suggests that it is unlikely that the no-harm rule, as currently formulated, could be successfully enforced against states if they attempt geoengineering and cause environmental harm.[29] Bodle argues that it may be difficult to prove that a 'particular geoengineering activity caused particular harm to the environment of other states or of areas beyond national control.'[30] He also suggests that, even if the no-harm rule could be successfully enforced, it would only provide a retrospective response to geoengineering.[31] In other words, it cannot *prevent* states from causing transboundary harm or harm to the global commons. This approach primarily suggests that the no-harm rule will only make a valuable contribution to the governance of SAI if it can be enforced against states that cause transboundary harm.

This emphasis on enforcement reflects broader assumptions concerning the relationship between enforcement/sanctions and international law. International law does not have the same mandatory dispute settlement or enforcement mechanisms as does domestic law.[32] This does

[23] René Lefeber, *Transboundary Environmental Interference and the Origin of State Liability* (Kluwer Law International, 1996) 35-46.
[24] Ibid, 10. This extends to indirect incidences of harm where direct harm to the global environment 'manifests itself on the territory of another state'.
[25] Xue Hanqin, *Transboundary Damage in International Law* (Cambridge University Press, 2003) Part III.
[26] Roda Verheyen, *Climate Change Damage and International Law: Prevention Duties and State Responsibility* (Koninklijke Brill NV, 2005), 145-186.
[27] Ibid, 169.
[28] Owen McIntyre, 'The Role of Customary Rules and Principles of International Environmental Law in the Protection of Shared International Freshwater Resources' (2006) 46(1) *Natural Resources Journal* 157
[29] Bodle, above n 16, 306-308.
[30] Ibid 306. Bodle suggests reversing the burden of proof for the no-harm rule and geoengineering.
[31] Ibid 308.
[32] See Frederic L Kirgis, 'Enforcing International Law' (1996) 1(1) *ASIL Insights* <https://www.asil.org/insights/volume/1/issue/1/enforcing-international-law>. But see Madeleine K. Albright, 'Enforcing International Law' (1995) 89 *Proceedings of the Annual Meeting (American Society of International Law)* 574. In the context of international peace and security, Albright suggests that the UN Security Council

not match with the positivist, 'Austinian' view that law functions through coercion and therefore must be supported by the threat of sanctions,[33] but even in the absence of mandatory enforcement mechanism, states generally tend to obey international law.[34] As famously stated by Henkin, 'almost all nations observe almost all principles of international law and almost all of their obligations almost all of the time.'[35] Accordingly, the potential of the no-harm rule to contribute to the governance of SAI should not be downplayed merely because it may be difficult to enforce the no-harm rule against non-complying states.

2.3 APPROACH NUMBER THREE: THE NO-HARM RULE AS THE BASIS FOR STATE RESPONSIBILITY FOR HARM

Since 2015, several legal scholars have begun to consider the potential of the no-harm rule to form the basis of a claim for state responsibility for significant transboundary harm that might result from future attempts at SAI.[36] Under customary international law, states are internationally responsible for breaching 'primary' legal obligations.[37] These are substantive rules of international law (i.e. that require, permit or prohibit certain conduct on behalf of states).[38] Responsibility may give rise to so-called 'secondary' obligations, such as the duty to make reparations for harm caused.[39] The International Law Commission has attempted to codify this area of international law in its 2001 *Draft Articles on the Responsibility of States for Internationally Wrongful Acts*.[40] In this approach, legal scholars have focused on whether

possess strong enforcement mechanisms. However, it is the responsibility of individual states to implement enforcement mechanisms (at 576).

[33] Denise Meyerson, *Jurisprudence* (Oxford University Press, 2011), 14.

[34] Koh, above n 9, 2600.

[35] Louis Henkin, *How Nations Behave* (Columbia University Press, 2nd ed, 1979) 47.

[36] David Reichwein et al, 'State Responsibility for Environmental Harm from Climate Engineering' (2015) 5(2-4) *Climate law* 142; Barbara Saxler, Jule Siegfried and Alexander Proelss, 'International liability for transboundary damage arising from stratospheric aerosol injections' (2015) 7(1) *Law, Innovation and Technology* 112.

[37] See, eg, *Chorzów Factory Case (Germany v. Poland) (Jurisdiction)* (1927) *P.C.I.J., Ser. A, No. 9*, 21; *Corfu Corfu Channel Case (United Kingdom v Albania) (Merits)* [1949] ICJ Rep 4, 23; Draft Articles on State Responsibility with commentary Draft Article 1. The distinction between primary and secondary rules of international law is made by the ILC in its Draft Articles on State Responsibiltiy (at 31) This follows the distinction made by H L A Hart, *The Concept of Law* (Clarendon Press, 2nd ed, 1994) Part V. This project follows this distinction in the literature. However, it recognises that some legal scholar have argued that this distinction is confusing. See, eg, Ian Brownlie, *The Rule of Law in International Affairs: International Law at the Fiftieth Anniversary of the United Nations* (Martinus Nijhoff Publishers 1998) 5-6.

[38] Alan E. Boyle, 'State Responsibility and International Liability for Injurious Consequences of Acts Not Prohibited by International Law: A Necessary Distinction?' (1990) 39(1) *The International and Comparative Law Quarterly* 1, 10.

[39] Ibid.

[40] 'Draft Articles on Responsibility of States for Internationally Wrongful Acts, with commentaries' (2001) II(2) *Yearbook of the International Law Commission* 31 ('*Draft Articles on State Responsibility*'). 'Attempted' in the sense that the *Draft Articles on State Responsibility* have not been formally signed or ratified by states as an

SAI might breach the no-harm rule as a primary rule of international law and give rise to secondary obligations under the law of state responsibility.

Reichwein et al engage in a detailed examination of the potential of the no-harm rule to hold states responsible for transboundary harm that might be caused by future attempts at SAI.[41] As part of this examination they consider the content of the no-harm rule and what states must do to uphold their obligations under it. Reichwein et al suggest that the main obstacle to establish whether SAI would breach the no-harm rule and to recover compensation for associated damage would be the element of causation.[42] That is, a causal link must be established between a specific SAI and harm (or risk of harm) caused.[43] Saxler, Siegfried and Proelss also consider the no-harm rule as part of a broader analysis of existing international legal mechanisms that could be used hold states liable for environmental damage from SAI and provide the basis for compensation.[44] For them, the biggest obstacle for holding states responsible and liable is establishing fault, not causation. In their view, it must be established that a state failed to act with due diligence in attempting SAI in order to trigger secondary rules of state responsibility.[45]

Compared to the previous two approaches, Reichwein et al and Saxler, Siegfried and Proelss provide more nuanced analyses of the potential role of the no-harm rule in responding to the environmental risks of SAI. They also engage in detailed consideration of the applicable rules of state responsibility and how they might operate to provide compensation to states should SAI be attempted by another state and cause them harm. However, similarly to Bodle above, the primary focus of this research is the potential of the no-harm rule to respond to SAI retrospectively or '*ex post*' – after harm has been caused. They do not provide a detailed analysis of how the no-harm rule might address the environmental risks of SAI in an anticipatory or pre-emptive way.

A further issue with considering the no-harm rule only from the perspective of state responsibility is that it provides a limited perspective on the rule's capacity respond to risks of harm to the atmosphere *per se* presented by SAI. The atmosphere is a fluid body of gases that

international agreement. Nonetheless, certain provisions have been widely accepted by states and international courts and tribunals as representing customary international law. See, eg *Gabcikovo-Nagymaros* case [47] [50] [79] [83].

[41] Reichwein et al, above n 36.

[42] Ibid, 180. The difficulty in establishing causation between an activity and damage is a common issue when it comes to compensation for transboundary environmental harm. See, eg, Alexandre Kiss, 'Present Limits to the Enforcement of State Responsibility for Environmental Damage ' in Francesco Francioni and Tullio Scovazzi (eds), *International Responsibility for Environmental Harm* (Graham and Trotman, 1991) 5-6.

[43] Reichwein et al, above n 36, 157, 180

[44] Saxler, Siegfried and Proelss, above n 36, 113.

[45] Ibid, 123.

exists beyond the individual sovereign control of states.[46] The legal status of the atmosphere and who has legal standing to enforce its protection is unclear.[47] It is therefore also unsettled how the rules of state responsibility operate concerning harm to the atmosphere as opposed to harm to states.[48] It has been suggested that states have an obligation *erga omnes* to protect the atmosphere which is owed to the international community as a whole.[49] However, as noted by Reichwein et al, this is not fully settled under international law.[50] These accounts suggest that it is unlikely that an action might be brought to enforce the no-harm rule against states and if they attempt SAI and cause harm to the atmosphere. Viewing the no-harm rule solely through the lens of state responsibility and liability therefore implicitly suggests that it has a limited capacity to protect the atmosphere from threats of harm.

2.4 RECONSIDERING THE POTENTIAL OF THE NO-HARM RULE

These three approaches highlight a number of gaps in how the no-harm rule is understood in literature on geoengineering governance. As noted above, there is a general lack of awareness in non-legal literature as to the binding legal status of the no-harm rule as a principle of customary international law. There is also a need to better understand the content of the no-harm rule and how it is to be interpreted to apply to SAI. Most significantly, however, there has been no detailed consideration of the potential of the no-harm rule to shape the behaviour of states to prevent or minimise the risks of transboundary harm and harm to the atmosphere if they should attempt SAI.[51]

This reflects a broader gap in legal literature on the no-harm rule: that is, the way in which the no-harm rule actually operates to influence the behaviours of states has largely been taken for granted by legal scholars. As mentioned above, there is a considerable body of existing legal

[46] Marvin S. Soroos, 'Preserving the Atmosphere as a Global Commons' (1998) 40(2) *Environment: Science and Policy for Sustainable Development* 6, 1.
[47] A detailed discussion of the legal status of the atmosphere is provided in chapter 7.3.1. See also Alan E Boyle, 'International Law and the Protection of the Global Atmosphere: Concepts, Categories and Principles' in Robin Churchill and David Freestone (eds), *International Law and Global Climate Change* (Graham & Trotman Limited, 1991) 7; Marvin S. Soroos, *The Endangered Atmosphere: Preserving a Global Commons* (University of South Carolina Press 1997), 208-223.
[48] See Boyle, above n 47, 16-17; Reichwein et al, above n 36, 178.
[49] Reichwein et al, above n 36, 178.
[50] Ibid, 178.
[51] But see Neil Craik, 'International Law and Geoengineering: Do Emerging Technologies Require Special Rules?' (2015) 5(2-4) *Climate law* 111. Craik examines whether the duty to conduct an environmental impact assessment (EIA) can provide a structured, decision-making process for implementing geoengineering proposals so as to address environmental and social risks they might pose. As explained in chapter 6, the duty to conduct an EIA forms part of the duty of conduct or due diligence under the no-harm rule, as well as being a recognised rule of customary international law in its own right.

literature that examines the content and interpretation of the no-harm rule. It is widely recognised in this literature that the no-harm rule provides states with a 'duty of conduct' or 'due diligence' to prevent or minimise significant transboundary harm and harm to the global commons before it manifests.[52] The no-harm rule is therefore understood to set normative standards that states *should* comply with concerning activities that present a risk of significant transboundary harm and harm to the global commons. It is also understood to have shaped more specific obligations under Multilateral Environmental Agreements (MEA). Yet nothing has examined its practical operation in influencing state behaviour.

The assessment of state practice in legal scholarship on the no-harm rule does not equate with consideration of how the no-harm rule influences the *behaviour* of states. Under article 38(1)(b) of the *Statute of the International Court of Justice*, in order for a rule to qualify as custom, it must meet the elements of state practice and *opinio juris sive necessitatis*. That is, there must be sufficient evidence that the actions of states support the behaviour prescribed by the rule, and that the behaviour is motivated by a belief that the rule is obligatory.[53] Some legal scholars hold different opinions as to what qualifies as 'evidence' of state practice and *opinio juris*.[54] Nonetheless, state practice is generally thought to include physical acts as well as 'promissory acts'[55] (i.e. ratification of an agreement, diplomatic statements, votes cast in the UN general

[52] See, eg, Alan Boyle, 'Transboundary air pollution: a tale of two paradigms ' in S Jayakumar et al (eds), *Transboundary Pollution: Evolving Issues of International Law and Policy* (Edward Elgar, 2015) 233, 236-241; Jacqueline Peel, 'Unpacking the elements of a state responsibility claim for transboundary pollution ' in S Jayakumar et al (eds), *Transboundary Pollution: Evolving Issues of International Law and Policy* (Edward Elgar 2015) 51, 67. The content of this obligation is examined in detail in chapters 6 and 7 of this project.
[53] *North Sea Continental Shelf (Federal Republic of Germany v Denmark; Federal Republic of German v Netherlands)* (1969) ICJ Rep 3, 44.
[54] This has given rise to different 'theories' or 'approaches' to customary international law. This project acknowledges these different approaches. However, further consideration and evaluation of them is beyond the scope of this project, given that its focus is the role of the no-harm rule in international environmental governance and not proving its status as custom. See, eg, Michael Akehurst, 'Custom as a Source of International Law' (1976) 47(1) (January 1, 1976) *British Yearbook of International Law* 1; Daniel Bodansky, 'Customary (and Not So Customary) International Environmental Law ' (1995) 3 *Indiana Journal of Global Legal Studies* 105; Hilary Charlesworth, 'The Unbearable Lightness of Customary International Law' (1998) 92 *Proceedings of the Annual Meeting (American Society of International Law)* 44; Bin Cheng, 'United Nations Resolutions on Outer Space: "Instant" International Customary Law?' (1965) 5 *Indian Journal of International Law* 23; Hiram. E. Chodosh, 'Neither treaty nor custom: the emergence of declarative international law' (1991) 26 *Tex. Int'l LJ* 87; Anthony D'Amato, 'The Theory of Customary International Law' (1988) 82(ArticleType: research-article / Full publication date: APRIL 20-23, 1988 / Copyright © 1988 American Society of International Law) *Proceedings of the Annual Meeting (American Society of International Law)* 242; J Patrick Kelly, 'The Twilight of Customary International Law ' (1999-2000) 40 *Virginia Journal of International Law* 449; Frederic L. Kirgis, Jr., 'Custom on a Sliding Scale' (1987) 81(1) *The American Journal of International Law* 146; Anthea Elizabeth Roberts, 'Traditional and Modern Approaches to Customary International Law: A Reconciliation ' (2001) 95 *The American Journal of International Law* 757.
[55] Karol Wolfke, *Custom in Present International Law* (Martinus Nijhoff Publishers 2nd ed, 1993), 70.

assembly).[56] Legal scholars typically refer to the fact that the no-harm rule has been incorporated into a number of binding and non-binding instruments to support its status as custom, including Principle 21 of the *Stockholm Declaration* and Principle 2 of the *Rio Declaration*.[57] Such analysis is directed at establishing the status of the no-harm rule as a binding rule of customary international law and, as noted above, it is traditionally assumed in legal scholarship that if rules are binding, they will influence the behaviour of actors. It is therefore unsurprising that legal scholars have not further considered questions how the no-harm rule might influence the behaviour of states.

It is, however, surprising that international relations scholars have not widely considered questions of compliance with the no-harm rule. As mentioned in the introduction, the no-harm rule has had a long history – it has been formally recognised as a principle of customary international law for over seventy years. As is demonstrated in this project, the no-harm rule has been invoked in some disputes[58] but not in others.[59] This raises key questions of compliance and effectiveness of the no-harm rule, yet generally speaking, international relations scholars have not engaged with the no-harm rule. To borrow the words of Raustiala and Slaughter, there has been little engagement from legal scholars and international relations scholars alike on whether, when and how the no-harm rule 'matters' to the behaviour of states.[60]

Answers to these questions are necessary to challenge some of the assumptions listed above. Understanding the role of the no-harm rule in international environmental governance (beyond its potential to form the basis of a claim for state responsibility) is needed to ensure that the potential of the no-harm rule to contribute to the governance of SAI is not being downplayed without sufficient cause. A better understanding of how the no-harm rule 'matters' to the behaviour and decision-making of states may also help non-legal scholars to recognise the rule

[56] See, eg, Philippe Sands and Jacqueline Peel, *Principles of International Environmental Law* (Cambridge University Press, 3rd ed, 2012) 112; Patricia Birnie, Alan Boyle and Catherine Redgwell, *International Law and the Environment* (Oxford Univerity Press, 3rd ed, 2009) 23.
[57] See, eg, Sands and Peel, above n 56, 113; Verheyen, above n 26, 147.
[58] See, eg, *Trail Smelter (United States v Canada) (Awards)* (1938 and1941) 3 RIAA 1905; *Corfu Channel Case (United Kingdom v Albania) (Merits)* [1949] ICJ Rep 4; *Aerial Herbicide Spraying (Ecuador v Colombia) (Order of 13 September 2013)* [2013] ICJ Rep 278; *Certain Activities Carried Out by Nicaragua in the Boarder Area (Costa Rica v Nicaragua) & Construction of a Road in Costa Rica Along the San Juan River (Nicaragua v Costa Rica) (Judgment)* (International Court of Justice, General List No 150 & 152, 16 December 2015).
[59] Examples of situations where the no-harm rule was not invoked are the Chernobyl nuclear disaster and the ongoing issue of smoke haze over South East Asia from forest fires in Indonesia. These example and others are discussed in chapter 8.3.8.
[60] Kal Raustiala and Anne-Marie Slaughter, 'International Law, International Relations and Compliance ' in Walter Carlsnaes, Thomas Risse and Beth Simmons (eds), *Handbook of International Relations* (Sage Publications, 2002) 538, 538.

and dispel the myth that there are no rules of international law that can constrain attempts at SAI. SAI therefore provides a lens to examine the content of the no-harm rule and how it should be interpreted to apply to activities that present risks of harm to the territory of other states and to the atmosphere. It also provides a lens to consider questions of compliance with the no-harm rule and how it is likely to influence the behaviour of states.

3 Research Design

Parts of this chapter are published in Kerryn Brent, Jeffrey McGee, and Amy Maguire, 'Does the 'No-Harm' Rule Have a Role in Preventing Transboundary Harm and Harm to the Global Atmospheric Commons from Geoengineering?' (2015) 5(1) *Climate law* 35. Permission has been granted from the editor to reproduce sections of this article in this chapter (See appendix 2).

This chapter explains the research design of this project. Section 3.1 draws on the research gaps and issues highlighted in the previous chapter to establish the research aims and specific research questions addressed in this project. Section 3.2 explains how doctrinal legal analysis is used to address the research aims and specific research questions. Section 3.3 explains how international relations (IR) theories can be used in addition to doctrinal legal analysis to deepen our understanding of compliance with international legal norms. This section also considers what type of IR approach is best suited to analyse the potential of the no-harm rule to promote compliance in the context of future attempts at SAI. Finally, section 3.4 provides an overview of interactional law theory, which is the approach used in this project to analyse questions of compliance with the no-harm rule.

3.1 RESEARCH AIMS

This project has three broad research aims directed at addressing the issues and research gaps identified in the previous chapter. The first broad aim of this project is to challenge the assumption that SAI is largely permitted under existing international law. The potential significance of customary international law to the governance of SAI (and geoengineering more generally) is not widely recognised or understood in geoengineering literature, especially the articles and reports targeting interdisciplinary audiences. This research addresses this issue by clarifying the scope no-harm rule and the obligations states may have under this rule should they decide to attempt SAI in the future.

The second aim of this project is to rebut suggestions that the content of the no-harm rule is unclear and therefore incapable of guiding the behaviour of states when it comes to future attempts at SAI. As noted in the previous chapter, literature that suggests the no-harm rule and/or its application to SAI is unclear typically does not engage in a detailed analysis of key primary and secondary sources on the no-harm rule. Without this analysis, it is difficult to judge how the no-harm rule might apply or operate in the context of SAI. This project therefore undertakes a detailed analysis of these sources to establish the scope of the no-harm rule and

the nature of the obligations it provides states with. It then considers how the no-harm rule might be interpreted to apply to future attempts at SAI.

The third broad aim of this project is to address the gap in the literature regarding the potential of the no-harm rule to influence the behaviour of states to prevent significant transboundary harm and harm to the global commons from SAI. In doing so, this research questions widely-held assumptions regarding compliance with the no-harm rule. It challenges assumptions that states will comply with the no-harm rule because of its binding status, or that they will only comply if the no-harm rule can be enforced against them. This approach will complement existing consideration of the no-harm rule as a basis for state responsibility and reparations for harm caused. Through this analysis, this research provides a more comprehensive account of the role of the no-harm rule in international environmental governance. It therefore considers what factors may contribute to compliance with the no-harm rule and how the no-harm rule might be developed in order to improve the likelihood of compliance with it should SAI be attempted in the future.

These three aims shape the specific research questions that are addressed in this project:

1. What is the history, content and underlying purpose of the no-harm rule in international environmental law?

2. To what extent does the no-harm rule, as currently formulated, respond to risks of transboundary harm and/or harm to the atmosphere from proposed SAI geoengineering activities?

3. What changes to the no-harm rule might be required to enhance its capacity to respond to risks of transboundary harm and/or harm to the global atmospheric commons should SAI be attempted in the future?

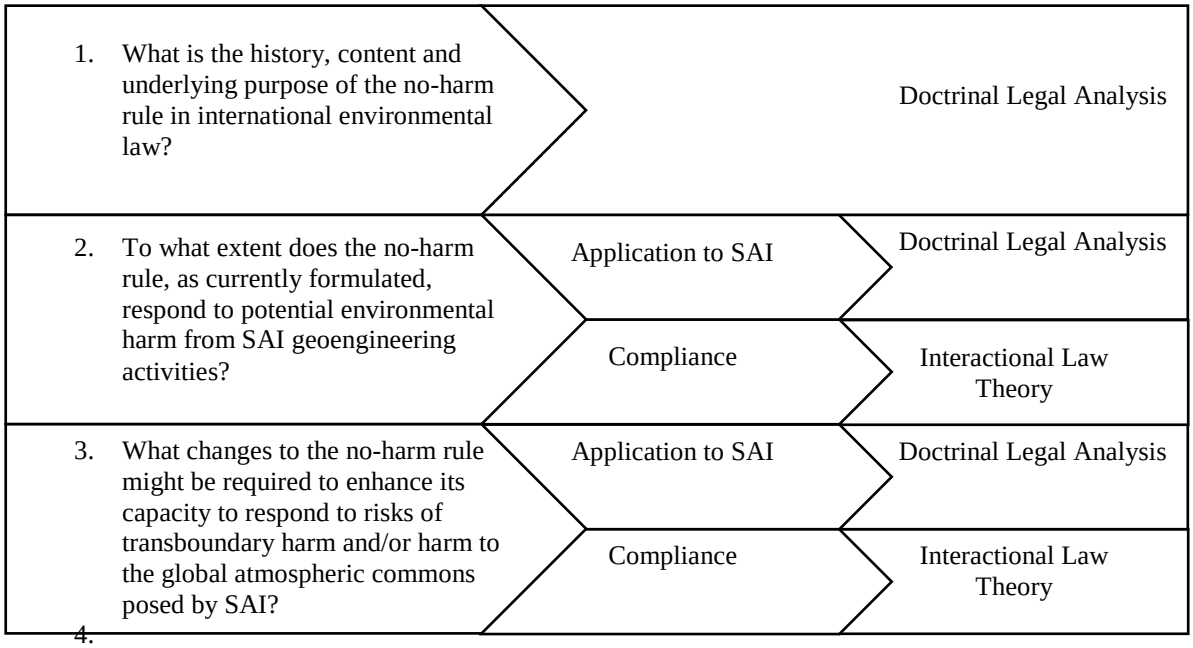
According to Hutchinson, the choice of research design should flow from the research questions.[1] In other words, a valid research design is one that enables the researcher to answer the research questions. In order to address the research questions and achieve my research aims, this project draws upon two theoretical frameworks: doctrinal legal analysis and interactional international law theory. Doctrinal analysis is used to analyse the content of the no-harm rule, as currently formulated, and how it is likely to apply to SAI. However, questions of compliance

[1] Terry Hutchinson, 'Doctrinal Research- Researching the Jury' in Dawn Watkins and Mandy Burton (eds), *Research Methods in Law* (Routledge, 2013) 726, 17-18. See also Mandy Burton, 'Doing empirical research: Exploring the decision-making of magistrates and juries' in Dawn Watkins and Mandy Burton (eds), *Research Methods in Law* (Routledge, 2013) 55.

with the no-harm rule and its capacity to influence the behaviour of states calls for an additional approach to complement doctrinal analysis. To answer these questions, this research applies interactional international law theory.

The way in which this research design matches the above research questions is summarised in figure 3.1 below:

Figure 3.1 Overview of Research Design



The following section explains the role of doctrinal legal analysis as a key element of my research design.

3.2 USING DOCTRINAL LEGAL ANALYSIS TO DETERMINE THE CONTENT OF THE NO-HARM RULE

This research uses doctrinal legal analysis to determine the content of the no-harm rule and analyse how it may be interpreted and applied to SAI. Doctrinal analysis is the traditional approach lawyers take to legal research. Generally speaking, it provides a framework for the study of legal concepts and principles.[2] Hutchinson and Duncan describe doctrinal analysis as a two part process. The first part is the process of locating relevant legal rules in sources of law; the second part is interpreting and analysing the legal rules to explain their content, how

[2] Terry Hutchinson and Nigel Duncan, 'Defining and Describing What We Do: Doctrinal Legal Research' (2012) 17(1) *Deakin Law Review* 83, 84.

they 'fit' within the wider legal system and how they might apply to a legal problem.[3] Doctrinal analysis therefore places emphasis on the use of primary legal sources, such as cases and statutes, to identify and interpret the law.

The first part of the doctrinal analysis process – locating the relevant rules – plays a more prominent role in international law scholarship. According to Ku, the basic objective of legal scholars in international law is to assess the status of legal norms.[4] The legal status of norms in domestic law is usually not an issue as laws are generally created by a recognised authority, such as a sovereign or parliament. However, as international law is a horizontal rather than a hierarchical system, legal scholars often feel the need to establish that a norm *is* law (i.e. that it is legally binding). The first key step in doctrinal legal analysis of international law research is therefore to assess the status of norms in accordance with the hierarchy international law sources as formally recognised in Article 38 of the *Statute of the International Court of Justice*. This involves locating international law as found in treaties, custom, general principles. [5] The decisions of international courts and tribunals and teachings of 'highly qualified publicists' can be used as a subsidiary means to determine international law.[6] That is, they constitute evidence of the law and provide important sources for understanding and interpreting the content of international legal norms.[7] However, they are not sources of law in their own right.[8]

The limits of doctrinal analysis in the study of international law are well-recognised, particularly amongst non-legal scholars. Doctrinal analysis has been criticised as being overly descriptive, technical and 'inaccessible to those who lack legal training.'[9] A further criticism is that doctrinal legal analysis adopts an 'authority' paradigm that is essentially inward looking

[3] Ibid 110-111; Hutchinson, above n 1, 13. See also Adilah Abd Razak, 'Understanding Legal Research' (2009) 4 *Integration & Dissemination* 19, 20.
[4] Charlotte Ku, *International Law, International Relations and Global Governance* (Routledge, 2012) 21.
[5] *The Statute of the International Court of Justice* art 38.
[6] Ibid.
[7] Ian Brownlie, *Principles of Public International Law* (Oxford University Press, 7th ed, 2008) 2, 24. Brownlie also notes that despite their status as a subsidiary source of international law, secondary sources are sometimes relied upon in the judgements of international and national courts and have occasionally had a formative influence on the development of certain areas of international law. See also J G Lammers, *Pollution of International Watercourses: A Search for Substative Rules and Principles of Law* (Martinus Nijhoff 1984), 503-504. According to Lammers, the judgments of international courts and tribunals may have a formative effect on the development of international law by influencing state practice and *opinio juris* (at 504).
[8] Brownlie, above n 7, 24. Brownlie also notes that despite their status as a subsidiary source of international law, secondary sources are sometimes relied upon in the judgements of international and national courts and have occasionally had a formative influence on the development of certain areas of international law.
[9] Jeffrey L Dunoff and Mark A Pollack, 'International Law and International Relations: Introducing an Interdiciplinary Dialogue ' in Jeffrey L Dunoff and Mark A Pollack (eds), *Interdiciplinary Perspectives on International Law and International Relations: The State of the Art* (Cambridge University Press, 2013) 3, 13.

and self-justifying.[10] That is, the study of law is restricted to legal sources without reference to external sources, such as empirical evidence, to validate claims.[11] Despite these shortcomings, Hutchinson insists that doctrinal analysis is indispensable to most legal research projects, because researchers must firstly understand the content of the law before they can research wider issues, such as the origins of law or its role in society.[12] This reflects how doctrinal legal analysis is used in this project.

This project uses doctrinal analysis to address research question (1) and to partly address questions (2) and (3). This research proceeds on the basis that the no-harm rule is a principle of customary international law as confirmed by the ICJ in the 1996 *Nuclear Weapons* advisory opinion.[13] It does not seek to challenge this view. However, given the unwritten and dynamic nature of the no-harm rule as a principle of customary international law, locating the no-harm rule in relevant sources of international law remains an important first step.[14] This research then engages in the second step of doctrinal legal analysis, which is to analyse the content of the no-harm rule as it currently stands and how it might be interpreted to apply to future attempts at SAI. Finally, on the basis of this analysis, this research recommends how the no-harm rule might be developed so as to enhance its doctrinal clarity and application to SAI in the future.

3.3 INTERNATIONAL RELATIONS THEORY AND COMPLIANCE WITH THE NO-HARM RULE

Doctrinal analysis provides the necessary framework for establishing the content of the no-harm rule, but an additional theoretical framework is needed to assess compliance with the no-harm rule and its capacity to influence the behaviour of states. Doctrinal analysis is unable to answer these questions, primarily because its scope is confined to the internal study of law as a system, essentially examining 'what the law is'[15] in isolation from a wider consideration of how it practically operates.[16] Doctrinal analysis does not provide a framework for considering

[10] Geoffrey Samuel, 'Interdisciplinarity and the Authority Paradigm: Should Law Be Taken Seriously by Scientists and Social Scientists?' (2009) 36(4) *Journal of Law and Society* 431. See also Dunoff and Pollack, above n 9, 16.
[11] Dunoff and Pollack, above n 9, 16.
[12] Hutchinson, above n 1, 17. See also Council of Australian Law Deans, 'Statement of the Nature of Legal Research ' (2005) <http://www.cald.asn.au/resources >, 3.
[13] *Legality of the Threat or Use of Nuclear Weapons (Advisory Opinion)* [1996] ICJ Rep 226, 241-242 ('*Nuclear Weapons (Advisory Opinion)*').
[14] See chapter 4.1.
[15] This is also referred to as *lex lata*.
[16] See Hutchinson, above n 1, 10, 15-16.

normative issues such as 'what the law ought to be,'[17] or the influence international law has on the behaviour of state and non-state actors.[18] When it comes to customary international law, doctrinal legal analysis takes the question of compliance for granted. As noted by Koh '[t]he very concept of obligatory custom assumes that nations, by virtue of their sovereign statehood, had de facto consented to compliance'.[19] A second theoretical framework is needed to assess the likelihood of compliance with the no-harm rule and recommend how the no-harm rule might be developed in order to improve this likelihood in the future.

In order to address these issues this project uses IR theory. IR can be broadly defined as the 'study of the interactions among the various actors that participate in international politics', including state and non-state actors.[20] The following section provides an overview of the development of interdisciplinary scholarship between international law and international relations, and in doing so highlights key theoretical approaches to compliance.

3.3.1 The development of international law and international relations scholarship

There is a long tradition of interdisciplinary research between international law (IL) and IR theory focusing on compliance. Both disciplines share a common interest in how actors in the international system can be governed.[21] By engaging in interdisciplinary research and adopting different lenses of inquiry, IL and IR scholars have gained additional insight and generated new knowledge concerning international governance.[22] IR scholars have engaged with international law in order to explain the relationship between international law and state behaviour.[23] IL also offers IR scholars a detailed understanding of legal rules and institutions.[24] Conversely, legal scholars have turned to IR as a source of theoretical approaches that can be used as lenses to consider issues concerning international legal norms and institutions.[25] This section provides a brief overview of the development of IR scholarship and its engagement

[17] This is also referred to as *lex ferenda*. For a detailed discussion of *lex lata* and *lex ferenda* in customary international law, see Noora Arajävi, 'Between Lex Lata and Lex Ferenda? Customary International (Criminal) Law and the Principle of Legality' (2010-2011) 163 *Tilburg Law Review* 163.
[18] Hutchinson, above n 1, 15. Hutchinson notes that one of the main criticisms of doctrinal legal analysis is that 'the researcher's view is narrowly confined within the box labelled 'law' and not concerned with the effects of the law in the world external to the black letter box.'
[19] Harold Hongju Koh, 'Why Do Nations Obey International Law?' (1997) 106 *Yale Law Journal* 2599, 2608.
[20] Karen A Mingst, *Essentials of International Relations* (W W Norton & Company 4ed, 2008) 2.
[21] Ku, above n 3, 4. See also Kal Raustiala and Anne-Marie Slaughter, 'International Law, International Relations and Compliance ' in Walter Carlsnaes, Thomas Risse and Beth Simmons (eds), *Handbook of International Relations* (Sage Publications, 2002) 538, 538.
[22] Ku, above n 3, 17.
[23] Raustiala and Slaughter, above n 21, 538.
[24] See Kenneth W Abbott, 'Modern International Relations Theory: A Prospectus for International Lawyers' (1989) 14 Yale Journal of International Law, 335, 339-340.
[25] Raustiala and Slaughter, above n 21, 538; Abbott, above n 24, 339-40; Dunoff and Pollack, above n 9, 10.

with international law. This overview is not a comprehensive history of interdisciplinary scholarship in this field — more detailed accounts can be found elsewhere.[26] It is merely intended to provide the necessary context for understanding how IR theory can be utilised to examine questions of compliance with the no-harm rule.

Modern IR scholarship developed following the end of World War II. Prior to WWII, international law was promoted as a 'worthy cause' that had the potential to promote international cooperation and peaceful relations.[27] When international institutions and treaties such as the League of Nations and the Kellogg-Briand Pact[28] failed to prevent the outbreak of war, a number of scholars came to question the capacity of international law to influence the behaviour of states.[29] Scholars such as Hans Morgenthau and E.H. Carr were critical of the potential of international law and institutions to govern international relations.[30] These new, 'realist' scholars argued that international law could not effectively influence the actions of states without centralised enforcement mechanisms.[31] They saw international law as having little influence over international relations, as it was only seen to play a meaningful role when it reflected the power interests of leading states.[32] This marginalisation of international law triggered a 'decades-long mutual estrangement' between the disciplines of IL and IR.[33] According to Abbott, IL scholars saw little point in engaging with a discipline that portrayed international law as impotent, and the overly 'legalistic' approach of IL scholars was of little interest to IR scholars.[34] However, realist scholarship presented a new way of thinking about the role of international law in international relations, and in doing so paved the way for other theories to develop.[35]

[26] See, eg, David Armstrong, Theo Farrell and Héléne Lambert, 'International Law and International Relations' in (Cambridge University Press 2ed, 2012); Raustiala and Slaughter, above n 21; Beth A Simmons, 'Compliance with International Law' (1998) 1 *Annual Review of Political Science* 74.
[27] Thomas M. Franck, 'The Power of Legitimacy and the Legitimacy of Power: International Law in an Age of Power Disequilibrium' (2006) 100(1) *The American Journal of International Law* 88, 89.
[28] *The Treaty of Peace between the Allied Powers and Germany Part 1 – The Covenant of the League of Nations*, signed at Versailles June 28 1919; *General Treaty for the Renunciation of War*, signed at Paris, August 27, 1928 ('Kellog-Briand Pact').
[29] Ku, above n 3, 21. For an historical overview, see Mingst, above n 20, 34-37.
[30] E H Carr, *The Twenty Years' Crisis 1919-1939: An Introduction to the Study of International Relations* (Macmillan, 1946); Hans J Morgenthau, Politics Among Nations (McGraw Hill, 1993). See also Armstrong, Farrell and Lambert, above n 26, 77-78.
[31] Dunoff and Pollack, above n 9, 5.
[32] Ibid, 5. Ku, above n 3, 21.
[33] Dunoff and Pollack, above n 9, 6.
[34] Abbott, above n 24, 337-338.
[35] Raustiala and Slaughter, above n 21, 540; Dunoff and Pollack, above n 9, 6.

Closely related to realism is rational choice theory.[36] Rational choice theory similarly takes an interest-driven approach to international relations.[37] It shares the underlying assumption with realism that states are rational actors that act in order to maximise their interests.[38] In addition to power, these interests can include wealth, security or other such material or reputational gains.[39] States are assumed to be motivated by a 'logic of consequence', in that their decision to create and/or comply with international law is determined by the likely outcome of their actions.[40] Generally speaking, rational choice theorists suggest that rules of international law have a more prominent role to play in influencing the behaviour of states that realist theories.[41] However, these theories suggest that international law is primarily a functional instrument that states use to pursue individual and/or collective interests. In the words of Franck, rationalist approaches represent international law as a 'disposable tool of diplomacy, its system of rules merely one of many considerations to be taken into account by government when deciding, transaction by transaction, what strategy is most likely to advance the national interest.'[42] While rationalist theories can provide a useful model for explaining how international law works, they present a limited view of the capacity of international law to independently influence the decision-making of states. As Goldsmith and Posner state, 'the possibilities for what international law can achieve are limited by the configurations of state interests and the distribution of state power.'[43] Rationalist approaches to international law have therefore triggered the development of alternative theories which challenge this view and seek to offer alternative explanations of compliance and the role of international law in international relations.[44]

[36] See, for example, the rationalist international law scholarship of Andrew T Guzman, *How International Law Works: A Rational Choice Theory* (Oxford University Press, Inc., 2008). See also the realist international law scholarship of Jack J Goldsmith and Eric A Posner, *The Limits of International Law* (Oxford University Press, 2007) and neo-realist international relations theory of Kenneth N Walz, *Theory of International Politics* (Waveland Inc, 1979).
[37] This research acknowledges different sub-fields of rational choice theory, including game theory and transactional cost economics. See Jack Goldsmith et al, 'Introduction' (2002) 31(S1) *The Journal of Legal Studies* S1, S3.
[38] Ibid, S1.
[39] Goldsmith and Posner, above n 36, 7. See also Guzman, above n 36, 71-117. Guzman considers how reputational gains and losses can affect the behaviour of states.
[40] James G. March and Johan P. Olsen, 'The Institutional Dynamics of International Political Orders' (1998) 52(4) *International Organization* 943, 949.
[41] See Guzman, above n 36, 11.
[42] Franck, 'Power of Legitimacy', above n 27, 89.
[43] Goldsmith and Posner, above n 36, 13.
[44] Dunoff and Pollack, above n 9.

One such alternative approach is to privilege the role of domestic and/or transnational institutions and actors in fostering compliance with international law.[45] In this regard, there is no single, unified approach — different theories attach different significance to the role of domestic and transnational actors in promoting compliance. The 'labels' that are generally given to these approaches include liberalism[46] and legalism[47]. Generally speaking, these approaches do not view states as individual, unitary actors, as is the case with realist and rationalist approaches. Instead, states are characterised as entities made up of different sub-actors and institutions with their own interests.[48] These include government and non-government organisations. Broadly speaking, these theories suggest that compliance with international law stems from the internalisation, incorporation and/or enforcement of international law rules by actors at a transnational and domestic level.[49] Therefore, the interests and/or values of these actors as opposed to individual 'states' are seen to be important in promoting compliance with international law.[50]

On the opposite end of the spectrum to realism and rationalism are normative approaches to compliance. These are theories that suggest that compliance with international law stems from normative considerations, rather than being based on utilitarian considerations. In IR theory, the most prominent school of thought is constructivism.[51] As with the other approaches mentioned above, there are different branches of constructivism.[52] However, the common theme in constructivist IR theory is that norms, identity and interest are seen to be mutually constitutive. Norms are seen to have the capacity to shape the identity and, hence, the interests and behaviour of actors.[53] Conversely, norms arise through processes of socialisation and

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[45] See, eg, Harold Hongju Koh, 'Transnational Legal Process' (1996) 75 *Nebraska Law Review* 181; Anne-Marie Slaughter, 'International Law in a World of Liberal States ' (1995) 6 *European Journal of International Law* 503. For a generalised explanation of how internal, domestic politics can affect compliance with international law and its capacity to influence environmental law problems, see Oran R Young and Marc A Levy, 'The Effectiveness of International Environmental Regimes' in Oran R Young (ed), *The Effectiveness of International Environmental Regimes* (Massachusetts Institute of Technology, 1999) 1, 26-27.
[46] Slaughter, above n 45.
[47] Simmons, above n 26, 83. Simmons uses the term 'democratic legalism'.
[48] Slaughter, above n 45, 241. Slaughter offers the metaphor of states as an atom, made up of various sub-components that relate to one another.
[49] See, eg, Koh, above n 45; Raustiala and Slaughter, above n 21, 547.
[50] See Slaughter, above n 45, 242; Raustiala and Slaughter, above n 21, 547.
[51] See, eg, Friedrich V. Kratochwil, *Rules, Norms, and Decisions: On the Conditions of Practical and Legal Reasoning in International Relations and Domestic Affairs* (Cambridge University Press, 1989); Alexander Wendt, 'Collective Identity Formation and the International State' (1994) 88(2) *American Political Science Review* 384; Emanuel Adler, *Communitarian International Relations: The Epistemic Foundations of International Relations* (Routledge, 2005); Martha Finnemore, *National Interests in International Society* (Cornell University Press, 1996).
[52] Mingst, above n 20, 72.
[53] See Armstrong, Farrell and Lambert, above n 26, 100-101.

interaction between actors.[54] In this view, identities, interests, and norms are socially constructed. Compliance with international law is therefore explained through the 'logic of appropriateness': states are socialised to comply with legal rules because it is the 'right thing to do'.[55]

The above paragraphs present only a brief overview of prominent IR theories.[56] It is beyond the scope of this project to engage in a detailed examination of *all* relevant approaches or to prove that one approach is more 'correct' than the others. Several scholars working on questions of law and compliance have acknowledged that different theoretical approaches may be useful depending on the context in which they are applied. For example, Franck, whose theory of compliance with international law follows the logic of appropriateness, suggests that, depending on the circumstances, different motivational factors may exert a stronger influence than others on states considering whether to comply with international rules.[57] Brunnée and Toope, whose theory similarly follows the logic of appropriateness, suggest that realist/rationalist power- and interest-based theories, which draw on the logic of consequence, may still be of some utility in explaining compliance with international law in some situations.[58] Guzman, a rational choice theorist, also proposes that alternative theories, including liberalism and constructivism, may offer explanations for compliance with international law where rational choice theory cannot.[59] In effect, these theories offer different 'lenses' to analyse questions of compliance. The relevant question is therefore not 'which lens is more correct', but which is best suited to address the research aims and questions of this project? That is, which theory is best suited to analyse the current capacity of the no-harm to promote compliance in the context of future attempts at SAI and recommend how the no-harm rule might be developed to enhance this capacity?

The compliance theorists above acknowledge the potential benefit of other theoretical approaches but do not offer a clear approach for selecting one school of thought over the others.

[54] Mingst, above n 20, 72; Jutta Brunnée and Stephen J Toope, *Legitimacy and Legality in International Law: An Interactional Account* (Cambridge University Press 2010) 14.
[55] March and Olsen, above n 40, 951-952; Raustiala and Slaughter, above n 21, 540, 546.
[56] For more detailed accounts see, Raustiala and Slaughter, above n 21; Armstrong, Farrell and Lambert, above n 26.
[57] Thomas M Franck, 'Legitimacy in the International Law System' (1988) 82 *American Journal of International Law* 705, 712.
[58] Brunnée and Toope, above n 54, 93.
[59] Guzman, above n 36, 20-21. For example, liberalism and constructivism may account for changes to state interests over time, and explain how those interests are formed.

This research therefore turns to the work of regime theorists Young and Levy to determine which theoretical approach is most suited to address the aims of this project.

3.3.2 Selecting a theoretical approach to analyse compliance with the no-harm rule

Young and Levy seek to understand how international environmental regimes influence the behaviour of state and non-state actors to address international environmental problems.[60] They define regimes as 'social institutions consisting of agreed upon principles, norms, rules, procedures, and programs that govern the interactions of actors in specific issue areas.'[61] Young and Levy recognise that there are different reasons as to why some regimes successfully address environmental problems, and why others do not.[62] Their research identifies and examines six 'behavioural mechanisms' through which regimes influence the behaviour of actors.[63] To a large extent, these mechanisms reflect the theoretical approaches to compliance outlined above, drawing on either the logic of consequence, logic of appropriateness or the idea that states are not necessarily unitary actors. Young and Levy recognise that different behavioural mechanisms (and sometimes multiple behavioural mechanisms) might account for the way in which regimes affect the behaviour of actors to achieve their aims.[64] Their theory provides models to assess the extent to which the success or failure of a regime can be attributed to different behavioural mechanisms. [65]

At first glance, the no-harm rule may not appear to fit the definition of a 'regime'. As a principle of customary international law, the no-harm rule is not as detailed as a multilateral environmental agreement. The no-harm rule is also general in the sense it does not address a specific issue area such as climate change or protection of the ozone layer. Despite these differences, the no-harm rule is nevertheless a socially constructed norm that has been created through the consent of states (as evidenced by state practice and *opinio juris*). Young and Levy's behavioural mechanism models are not 'case-study specific'- they are designed to be applied to different situations.[66] They focus primarily on the behaviour of actors rather than the

[60] Young and Levy, above n 45, 1-3.
[61] Marc A Levy, Oran R Young and Michael Zürn, 'The Study of International Regimes' (1995) 1(3) (September 1, 1995) *European Journal of International Relations* 267, 274.
[62] Young and Levy, above n 45, 1.
[63] Ibid, 3.
[64] See ibid, 20.
[65] Ibid, 21.
[66] Ibid, 21.

specific form of a regime. As such, Young and Levy's behavioural mechanism models can be applied to the no-harm rule.[67]

Application of these behavioural mechanisms has been largely retrospective – Young, Levy and other authors have used them to analyse how existing regimes operate to address specific environmental problems. For example, these pathways have been used to analyse the 1998 *International Convention for the Prevention of Pollution from Ships* (*'MARPOL'*)[68], the regime governing the Barents Sea Fisheries[69], and the *Convention on Long-range Transboundary Air Pollution* (*'LRTAP'*) convention and US-Canadian Memorandum of Intent for addressing the problem of Acid Rain in Europe and North America.[70] The no-harm rule has been recognised for over seventy years, but SAI is a future or 'hypothetical' environmental problem, in that it has not yet eventuated. The technology itself remains conceptual as it has not yet been field tested in the stratosphere. However, the fact that SAI is a future environmental problem does not mean that Young and Levy's models are of little value.

Behavioural mechanisms can be used prospectively to analyse compliance. One question that Young and Levy sought to address by developing their behavioural mechanism models is to identify when different behavioural mechanisms are 'likely to come into play as significant determinants of behaviour'.[71] This research therefore uses Young and Levy's behavioural mechanisms to indicate the way in which the no-harm rule will likely operate to influence the behaviour of state and non-state actors in the context of future attempts at SAI. In other words, these behavioural mechanisms are used to identify which theoretical approach will be most relevant to examine questions of compliance with the no-harm rule in this project.

Young and Levy propose six behavioural mechanism models: 'regimes as utility modifiers'; 'regimes as enhancers of cooperation'; 'regimes as bestowers of authority'; 'regimes as learning facilitators'; 'regimes as role definers'; and 'regimes as agents of internal realignments'.[72] This section considers the potential operation of these mechanisms in the context of the no-harm rule and SAI. Through a process of elimination, this section

[67] Young and Levy, above n 45, 19.
[68] Ronald Mitchell et al, 'International Vessel-Source Oil Pollution ' in Oran R Young (ed), *The Effectiveness of International Environmental Regimes* (The MIT Press, 1999) 33
[69] Olav Schram Stokke, Lee G Anderson and Natalia Mirovitskaya, 'The Barents Sea Fisheries' in Oran R Young (ed), *The Effectiveness of International Environmental Regimes* (The MIT Press, 1999) 91.
[70] Don Munton et al, 'Acid Rain in Europe and North America ' in Oran R Young (ed), *The Effectiveness of International Environmental Regimes: Causal Connections and Behavioural Mechanisms* (The MIT Press, 1999) 155.
[71] Young and Levy, above n 45, 21.
[72] Ibid, 22-27.

recommends which models (and, hence, which theoretical approaches corresponding to those models) are best for analysing the potential effectiveness of the no-harm rule in this context.

The first two models — regimes as utility modifiers and regimes as enhancers of cooperation — reflect 'logic of consequence' theories of compliance, such as rational choice theory, in that they attribute the behaviour of actors to desired outcomes. The model of 'regimes as utility modifiers' assumes that actors are 'self-interested utility maximizers whose behaviour will be guided by institutional arrangements to the extent that they alter the costs and benefits individual actors attach to well-defined options.'[73] The causal mechanism responsible for the behaviour of actors in this model is therefore the relative costs and benefits of action created by the regime. The second model, 'regimes as enhancers of cooperation' is similar to the first, as it also perceives actors as self-interested and unitary.[74] However, the driver of behaviour is the desire to achieve collective outcomes and reap joint gains.[75]

Foreseeability of outcomes is central to the function of these behavioural mechanisms. Foreseeability is important because it enables actors to judge the likely outcome of their decisions in order to calculate the cost or benefit that will flow from them. This is implied in statements that Young and Levy make regarding the Ozone Regime. They state that, at one point, it was unclear how this regime would evolve.[76] This lack of foreseeability made it difficult for chemical manufacturers to decide whether to switch to HCFCs.[77] In other words, it was difficult for the manufacturers to make a decision to follow the regime based on utilitarian considerations as the implications of such a decision was unclear. Young has further developed this argument in relation to the UNFCCC.[78] He suggests that calculating the costs and benefits of taking steps to address climate change is 'little more than guesswork'.[79] Given the profound level of uncertainty, ordinary utilitarian considerations are likely to be of little use in influencing the behaviour of actors in relation to climate change.[80] Therefore, as a general rule, utilitarian behavioural mechanisms are unlikely to exert a strong influence over

[73] Young and Levy, above n 45, 22.
[74] Ibid, 23.
[75] Ibid.
[76] Ibid, 22.
[77] Ibid.
[78] Oran R Young, 'Does fairness matter in international environmental governance? Creating an effective and equitable climate regime ' in Todd L Cherry, Jon Havi and David M McEvoy (eds), *Towards a New Climate Agreement: Conflict, Resolution and Governance* (Routledge 2014) 16, 19.
[79] Ibid, 19.
[80] Ibid, 18-19.

the behaviour of actors where the consequences of their actions are not reasonably foreseeable.[81]

Foreseeability is an important factor for determining the behavioural mechanisms that the no-harm rule will likely operate through in the context of future attempts at SAI. Leading geoengineering scientists and governance scholars suggest that future decisions by states to deploy SAI will be based on a utilitarian calculation: weighing the risks and uncertainties of SAI impacts against the risks and uncertainties of climate change.[82] However, the consequences of engaging in SAI may be too uncertain for states to calculate its net utility through a cost/benefit-style calculation. The magnitude of the uncertainty that surrounds geoengineering use and impacts (including SAI) was stressed by the Royal Society in its 2009 report on geoengineering.[83] The report notes that there is a poor understanding of the potential impacts and side-effects of geoengineering, and even less understanding of their probability.[84] Assessing the future outcomes of geoengineering will be more a situation of 'indeterminacy' or 'ignorance', as opposed to balancing foreseeable risks.[85] It is possible that some uncertainties may be reduced by future research, but the 'possibility remains that an unknown hazard may be revealed at a later time.'[86] In light of this irreducible uncertainty, it may be difficult for states to calculate the utility of engaging in SAI, and, hence, how the decision to comply with the no-harm rule will alter the costs and benefits likely to flow from it. For this reason, this research suggests that it is unlikely utilitarian considerations will significantly shape the decision-making of states to comply with the no-harm rule when it comes to field testing or deploying SAI.

As utilitarian models are unlikely to significantly account for the behaviour of actors in the context of future SAI, it is necessary to consider the remaining four models proposed by Young and Levy that draw on non-utilitarian considerations. The model of 'regimes as agents of

[81] O. R. Young, 'Sugaring off: enduring insights from long-term research on environmental governance' (2013) 13(1) *International Environmental Agreements-Politics Law and Economics* 87, 94-95.
[82] See Scott Barrett, 'Solar Geoengineering's Brave New World: Thoughts on the Governance of an Unprecedented Technology' (2014) 8(2) (July 1, 2014) *Review of Environmental Economics and Policy* 249, 254. See also David Keith and Gernot Wagner, 'To help cool the climate, add aerosol', *Wired* (5 October 2016) < https://www.wired.com/2016/10/help-cool-climate-add-aerosol/>; Floor Fleurke, 'Future Prospects for Climate Engineering within the EU Legal Order' (2016) 7 *European Journal of Risk Regulation* 60, 63, 71. Fleurke suggests that precaution could be used as a mechanism to enable states in the EU to engage in a risk-risk trade-off between geoengineering and climate change.
[83] The Royal Society, 'Geoengineering the climate: science, governance and uncertainty ' (The Royal Society 2009), 37–38.
[84] Ibid.
[85] Ibid, 38.
[86] Ibid.

internal realignment' characterises states as non-unitary actors.[87] It emphasises the role of other actors at a transnational and domestic level, including corporations and NGOs.[88] It suggests that regimes 'affect behaviour by creating new constituencies or shifting the balance among factions or subgroups vying for influence within individual states or other actors.'[89] In this sense, rules and regimes can be used by these actors as 'ammunition' to press their cause and change how states perceive and/or act in relation to environmental problems.[90] This model therefore reflects liberal IR theories of compliance.

It is possible that the no-harm rule could have some influence through this behavioural mechanism when it comes to future use of SAI. However, this would go against the current trend. As noted in the previous chapter, beyond the work of international law scholars, the potential significance of the no-harm rule is not widely understood in geoengineering literature. Given this current lack of understanding and awareness, it is difficult to imagine that the no-harm rule will have a significant influence on the behaviour of actors at transnational and state levels. Young and Levy give examples of environmental and other interest groups that lobbied and built new alliances to influence behaviour of states and other key actors with regards to the *MARPOL* convention and the *LRTAP* convention.[91] There are certainly transnational and domestic environmental NGOs that lobby for environmental protection. But in spite of the no-harm rule's long history, there are no prominent examples of such groups *specifically* using the no-harm rule to press their own agenda, or of the no-harm rule influencing the alignment of domestic groups and organisation. It may be that greater research is needed in this regard. Then again, as explained further in chapter eight, the no-harm rule has been conspicuously absent from the dialogue surrounding key environmental disputes. Given this trend, it appears unlikely that the no-harm rule will have a strong effect on the behaviour of key state and non-state actors through this behavioural mechanism in the event of future attempts at SAI.

Another behavioural mechanism that appears unlikely to play a major role in influencing the behaviour of states in the context of the no-harm rule and SRM is 'regimes as learning facilitators.' This model explains the effect of regimes on actor behaviour through the ways in which they stimulate individual and social learning processes.[92] The idea is that learning processes can give rise to new perspectives and understandings regarding the nature of

[87] Young and Levy, above n 45, 26.
[88] Ibid.
[89] Ibid.
[90] Ibid.
[91] Ibid, 27.
[92] Ibid, 24.

environmental problems and the potential of measures to solve them.[93] These perspectives can redefine the interests of actors and how they choose to act in relation to an environmental problem.[94] Young and Levy use *LRTAP* as an example of a regime that has functioned as a learning facilitator. They suggest that *LRTAP* caused states to reassess their interests in addressing long-range transboundary air pollution through enhancing their understanding of its causes and generating awareness of the impact it has on human health and the environment.[95] It is possible that procedural obligations under the no-harm rule, such as the duty to conduct an environmental impact assessment (EIA) and the duty to notify and consult with other potentially affected states, may provide states with a deeper understanding of the potential risks and side effects of a proposed attempt at SAI. However, Young and Levy note that 'the processes through which learning occurs are not well understood.'[96] Given this theoretical uncertainty, and the current level of scientific uncertainty that surrounds SAI, it is unclear the extent to which the no-harm rule might cause states to reassess and redefine their interests concerning SAI.

This narrows the choice of relevant behavioural mechanisms down to two: 'regimes as bestowers of authority' and 'regimes as role definers'. Both models are non-utilitarian. Young and Levy suggest that non-utilitarian mechanisms 'come into focus once the utilitarian emphasis on calculations of benefits and costs is set aside.'[97] If actors cannot be forced to comply with international rules and regimes, and utilitarian considerations are unlikely to convince them that it is more beneficial to comply than not, rules and regimes must (by default) operate through non-utilitarian mechanisms, such as the logic of appropriateness.[98] Young makes this argument in the context of the *UNFCCC*, using the language of 'fairness'. He states that:

> [T]he only way forward is to devise governance systems that members feel obligated to abide by because they were developed through procedures regarded as fair and because their major provisions add up to what they can accept as an equitable deal.[99]

Fairness may be important in the context of climate change, however, there are other means through which a sense of obligation to comply with international rules and regimes can be developed.

[93] Ibid.
[94] Ibid, 25.
[95] Ibid.
[96] Ibid.
[97] Ibid, 23.
[98] Young, above n 78, 20.
[99] Ibid.

Young and Levy's model of 'regimes as bestowers of authority' more broadly adopts the logic of appropriateness. It suggests that actors follow regimes out of a sense of legitimacy or authority.[100] That is, actors comply because it is the right thing to do, and they have been socialised to understand that it is the right thing to do.[101] This model reflects logic of appropriateness theories of compliance with international law, such as the theories of legitimacy and fairness posed by Franck[102] and the theory of legal obligation posed by Brunnée and Toope.[103] This model also reflects constructivist IR theory.

The suggestion that actors are socialised to understand that it is 'right' to comply with legal rules overlaps with the final model of 'regimes as role definers'.[104] This model reflects constructivist understandings concerning the creation and role of norms in international governance. It suggests that norms (including legal norms), identities and interests are mutually constitutive. Actors may create rules, but rules in turn can shape the identity, interests and roles of actors.[105] This model looks beyond utilitarian considerations to consider how states form their interest and define their roles in the first place. In other words, rules and regimes do not operate by appealing to the fixed interests of actors. They instead operate by changing the interests of actors and how they see their role in international relations.[106] Young and Levy do not expressly recognise a relationship between 'regimes as bestowers of authority' and 'regimes as role definers'. However, broader IR literature suggests that these two mechanisms may operate together to a certain extent to promote compliance.[107] For example, what actors consider to be the 'appropriate' course of action will likely be shaped by existing social structures and norms.[108]

Young and Levy's behavioural mechanisms therefore suggest that in the context of SAI, the no-harm rule would most likely operate through the behavioural mechanisms of 'regimes as

[100] Young and Levy, above n 45, 23-24.
[101] Ibid.
[102] See Thomas M Franck, *The Power of Legitimacy Among Nations* (Oxford University Press, 1990); Franck, 'Power of Legitimacy', above n 27.
[103] Brunnée and Toope, above n 53.
[104] Young and Levy, above n 45, 25-26.
[105] Ibid.
[106] Ronald B Mitchell, 'Compliance Theory: Compliance, Effectiveness, and Behaviour Change in International Environmental Law ' in Daniel Bodansky, Jutta Brunnée and Ellen Hey (eds), *The Oxford Handbook of International Environmental Law* (Oxford University Press, 2007) 893, 902. According to Mitchell, '[r]ather than asking themselves 'what is in my interests', actors ask 'how do I want to see myself' and/or 'how do I want other actors to see me?'
[107] See, eg, ibid; Raustiala and Slaughter, above n 21, 540; Finnemore, above n 51, 29-30.
[108] Finnemore, above n 51, 29.

bestowers of authority' and 'regimes as role definers'. In other words, compliance would most likely be norm driven and based on a logic of appropriateness. A theoretical approach that considers both of these behavioural mechanisms would therefore be best suited to analyse questions of compliance with the no-harm rule. Furthermore, given that the no-harm rule is a legal norm, and not a merely social norm, it makes sense to adopt a theory that is tailored to analysing legal rules.

One possible approach is Franck's theory of legitimacy and compliance with international law.[109] Franck suggests that states are more likely to comply with legal rules that are perceived to be legitimate, that is, legitimate legal norms exert a 'compliance pull' on states which can overcome self-interest.[110] Franck's understanding of legitimacy is largely procedural. He defines legitimacy to mean 'that quality of a rule which derives from a perception on the part of those to whom it is addressed that it has come into being in accordance with right process.'[111] To put it simply, Franck suggests that rules of international law will be perceived as legitimate and exert a compliance pull if they are created in a certain way and have certain characteristics. This goes beyond merely formalising law in a recognised source (i.e. the 'pedigree' of a law).[112] According to Franck, the legitimacy of a rule depends on the degree to which it satisfies four indicators: determinacy, symbolic validation, coherence and adherence to a normative hierarchy.[113] The greater the extent to which a rule exhibits these indicators, the stronger compliance pull it will exert on states.[114] Franck argues that the capacity of a rule to exert a compliance pull on states depends on the extent to which these criteria are met.[115] Franck's theory therefore provides an approach for analysing compliance with international law based on the logic of appropriateness.

However, Franck's theory of legitimacy is not the best-suited to address the research aims of this project. This is because Franck's theory of legitimacy only speaks to one behavioural mechanism: 'regimes as bestowers of authority'. It does not address the interconnectivity between rules, the identities and interests of actors. Franck notes this limitation, stating that his theory's focus on the properties of rules 'does not yield a self-sufficient account of the process

[109] Franck, 'Power of Legitimacy Among Nations' above n 102.
[110] Franck, 'Legitimacy in International Law Systems', above n 57, 709.
[111] Ibid, 706.
[112] Ibid, 705.
[113] Franck, 'Power of Legitimacy Among Nations' above n 102, 49. Franck, 'Legitimacy in the International System', above n 57, 712.
[114] Franck, 'Power of Legitimacy Among Nations' above n 102, 49.
[115] Ibid.

by which nations are socialized into a rule-compliance community.'[116] In other words, Franck's theory of legitimacy does not fully address the way in which understandings of legitimacy and appropriateness are shaped in the first place. It therefore does not provide an approach for considering the behavioural mechanism of 'regimes as role definers' and how these two mechanisms might interact.

This project instead uses Brunnée and Toope's theory of interactional international law. Interactional law theory similarly draws on the logic of appropriateness to assess the capacity of legal norms to exert a 'compliance pull' on state and non-state actors. However, interactional law theory also incorporates constructivist understandings of how norms and the identities and interests of actors are mutually constitutive. It therefore provides an approach for considering how the no-harm rule might promote compliance through the behavioural mechanisms of 'regimes as role definers' and 'regimes as bestowers of authority'. By considering both behavioural mechanisms, interactional law theory will likely generate a more nuanced understanding of the potential of the no-harm rule to promote compliance when it comes to future attempts to govern SRM geoengineering. The following section examines interactional international law theory in more detail and explains how this theory is used in this project to assess the no-harm rule.

3.4 INTERACTIONAL INTERNATIONAL LAW THEORY

Interactional international law is a theory of legal obligation developed by Brunnée and Toope.[117] It draws on constructivist IR theory and the legal theory of Lon Fuller[118] to explain how legal obligation can be developed and maintained to enhance the compliance pull of rules of international law. As mentioned in chapter one, legal obligation is best described as a sense of legal legitimacy concerning individual legal norms and a broader sense of commitment or 'fidelity' to upholding international law as a whole.[119] According to Brunnèe and Toope, legal obligation is a characteristic that distinguishes legal norms from social norms and explains the particular way in which legal norms contribute to international relations and governance.[120] They claim that legal obligation enables international law to influence the behaviour of actors in the international law system, which lacks the hierarchical structure and central enforcement

[116] Franck, 'Power of Legitimacy Among Nations' above n 102, 49.
[117] Brunnée and Toope, above n 54, 19.
[118] Lon L Fuller, *The Morality of Law- Revised Edition* (Yale University Press, 1969).
[119] Brunnée and Toope, above n 54, 7.
[120] Ibid, 20

mechanisms that characterise domestic legal systems.[121] In this sense, interactional law theory explains the way in which legal norms influence the behaviour of state and non-state actors through the logic of appropriateness. However, interactional law theory does not merely seek to explain the role of legal obligation and legitimacy in international governance. It also explains how legal obligation is created and maintained through the way in which state and non-state actors interact with legal norms and with one another regarding rules of international law.

Legitimacy is a central concept in interactional law theory. Brunnée and Toope define legitimacy as the capacity of a legal norm to generate a sense of 'fidelity' or legal obligation to international law as a system, and not just to individual rules.[122] Legitimacy does not depend on the 'pedigree' of a norm, in that norms are not automatically legitimate if they have been formalised in treaties or customary law.[123] In interactional law theory, the legitimacy of a norm and its capacity to generate a sense of legal obligation depends on whether it satisfies the three key elements of interactional law theory.[124] These elements are shared understandings, Fuller's 'criteria of legality'[125] and practice of legality.[126] According to interactional law theory, legal norms that satisfy all three elements have a high degree of legitimacy, and will therefore exert a strong sense of legal obligation and compliance pull. Conversely, norms that do not satisfy all elements will exert a weaker sense of legal obligation and are therefore less likely to promote compliance. These elements are explained in the following sections.

3.4.1 The element of shared understandings

The constructivist concept of 'shared understandings' is central to interactional international law theory. According to Brunnèe and Toope, in order for rules of international law to promote a sense of legal obligation, actors must share a certain level of shared understandings.[127] These are 'collectively held background knowledge, norms or practices'.[128] Shared understandings provide legal norms with social legitimacy, which is the foundation from which more specific legal legitimacy can develop.[129] Brunnèe and Toope suggest that shared understandings do not

[121] Brunnée and Toope, above n 54, 6.
[122] Ibid, 53.
[123] Ibid, 52.
[124] Ibid 53.
[125] Fuller, above n 118, 34, 46-91.
[126] See Brunnée and Toope, above n 54, 15.
[127] Ibid, 56.
[128] Ibid, 64.
[129] Jutta Brunnée and Stephen J. Toope, 'Interactional international law: an introduction' (2011) 3(2) *International Theory* 307, 308.

necessarily need to be deep or complex in order to enable legal legitimacy and a sense of legal obligation to develop. That is, state and non-state actors do not need to ascribe to the same belief system, or hold the same political convictions.[130] However, at a basic level, there needs to be widely shared understandings between actors concerning the need for normativity (i.e. the need for law to shape behaviour) and the role or object of the specific legal norm in question.[131]

There are various accounts of how shared understandings are developed and maintained in constructivist IR theory. Brunnèe and Toope acknowledge the theory of 'norm entrepreneurship' proposed by Finnemore and Sikkink, in which state and/or non-state actors are responsible for actively building shared understandings around new norms.[132] They also acknowledge alternative theories that suggest that shared understandings are promoted through the work of 'epistemic communities', which are knowledge-based networks of experts (e.g. the Intergovernmental Panel on Climate Change).[133] However, Brunnèe and Toope suggest these approaches only provide a 'unidirectional' account of how shared understandings are generated.[134] That is, they explain the role of actors in developing shared understandings but fail to satisfactorily explain the 'mutual influence between actors and cognitive or normative structures' that is central to constructivist theory.[135]

In order to explain this process of mutual engagement and interaction between actors and normative structures, Brunnèe and Toope draw on the theories of Etienne Wenger[136] and Emanuel Adler[137]. Wegner and Adler suggest that 'communities of practice' are instrumental to the development of shared understandings. Communities of practice are 'groups of people informally bound together by shared expertise and passion for joint enterprise'.[138] Wegner developed and explored this concept in a domestic setting.[139] Adler adapted Wegner's theory to international relations. He suggests that the international system can be viewed as being made up of various 'communities of practice', such as 'communities of diplomats, of traders,

[130] Brunnée and Toope, above n 54, 80.
[131] Ibid, 80. ; Brunnée and Toope, *Interactional international law*, above n 129, 309-310; Adler, above n 51, 22.
[132] Brunnée and Toope, above n 54, 57-59;
[133] Ibid, 59. See, eg, Peter Haas, 'Epistemic Communities' in Daniel Bodansky, Jutta Brunnée and Ellen Hey (eds), *Oxford Handbook of International Environmental Law* (Oxford University Press, 2007) 791.
[134] Brunnée and Toope, above n 54, 62.
[135] Ibid, 61.
[136] Etienne Wenger, *Communities of Practice: Learning, Meaning and Identity* (Cambridge University Press, 1998).
[137] Adler, above n 51.
[138] Etienne Wegner and William M Snyder, 'Communities of Practice: The Organizational Frontier', (2000) Jan-Feb *Harvard Business Review* 139.
[139] Wegner, above n 136.

of environmentalists, and of human rights activists.'[140] Communities of practice are not international actors in their own right, but co-exist and overlap with them.[141] In Adler's view, communities of practice facilitate the development of collective understandings, shared discourses, actor identities and social learning.[142] They can catalyse new political agendas and directions for global governance.[143] Communities of practice are therefore central to the evolution, dissemination and practice of norms in international relations.[144]

The concept of communities of practice is adopted in interactional law theory. Brunnèe and Toope use Wegner and Adler's communities of practice approach to explain the mutually inclusive process through which agents and structures interact to generate and maintain shared understandings of legal norms.[145] They note that:

> The constructivist emphasis on the mutuality of agents and structures entails certain assumptions about how such understandings arise, and how they come to influence actors. On the one hand, agents generate and promote particular understandings, whether through norm entrepreneurship or through the work of epistemic communities. Shared understandings then emerge, evolve or fade through processes of social learning.[146]

The concept of communities of practice overlaps with the third element of interactional law theory, namely the practice of legality. However, at this stage of inquiry, communities of practice are relevant in that they facilitate the social learning and practice that is necessary to develop wide shared understandings between state and non-state actors regarding legal norms.[147]

3.4.2 Lon Fuller's criteria of legality

Shared understandings build social legitimacy around a legal norm, but Brunnèe and Toope maintain that more is needed to build *legal* legitimacy and a sense of legal obligation.[148] In order to explain how legal legitimacy and legal obligation are created, Brunnèe and Toope turn to the legal theory of Lon Fuller. Fuller was a legal scholar writing in the 1960's. As a natural law theorist, Fuller was of the view that law and morality are interrelated, in that the validity or legitimacy of legal rules is related to moral considerations rather than whether a rule arises

[140] Adler, above n 51, 15.
[141] Ibid, 15-16.
[142] Ibid.
[143] Ibid.
[144] Brunnée and Toope, above n 54, 63.
[145] Ibid, 64.
[146] Brunnée and Toope, above n 54, 64-65.
[147] See ibid, 63-64.
[148] Ibid, 53.

from a formal legal source.[149] This stands in contrast to the views of classical positivists such as John Austin, and modern positivists such as Herbert Hart, for whom legal rules do not necessarily need to satisfy any moral criteria in order to qualify as 'law' (i.e. law and morality are two separate concepts).[150] In his book, *The Morality of Law*, Fuller developed a procedural theory of natural law. Fuller's theory does not examine the substantive or 'external' morality of law (i.e. whether the content of a legal rule is moral). [151] Instead, Fuller's theory is directed at understanding the 'internal' morality of law. In this sense, legal legitimacy or 'legality' is derived from the intrinsic characteristics of laws and the process through which they are administered, rather than their substantive content. Fuller therefore considers the 'ways in which a system of rules for governing human conduct must be constructed and administered if it is to be efficacious and at the same time remain what it purports to be.'[152]

Central to Fuller's theory is his understanding of 'law'. Fuller defines law as 'the enterprise of subjecting human conduct to the governance of rules.'[153] He does not share the classical positivist view that legal norms are distinguished from social norms by the command of a sovereign and possibility of force being administered on non-compliance.[154] Fuller claims that 'law' is not dependant for its existence on an Austinian hierarchy of power and command to promote compliance.[155] Instead, Fuller proposes that a rule only qualifies as 'law' if the subjects of the law can *reason with it and make choices regarding their conduct in light of the law*.[156] This creates a sense of 'fidelity' (i.e. a moral obligation) to individual laws and the legal system.[157] Fuller also suggests that law is not defined by the pedigree or level of formality of the sources within which it is contained.[158] Law should rather be understood 'in terms of the activity that sustains it'.[159] Brunnèe and Toope suggest that Fuller's concept of law bears strong parallels with constructivist IR literature and the concept of 'communities of practice', as it is

[149] See Denise Meyerson, *Jurisprudence* (Oxford University Press, 2011) 105. According to Meyerson, natural law theorists claim that 'law has, by its nature, moral value'.
[150] Ibid, 25; H L A Hart, *The Concept of Law* (Clarendon Press, 2nd ed, 1994) 202; John Austin, *The Providence of Jurisprudence Determined* (1832) in W E Rumble (ed) (Cambridge University Press, 1995) 157.
[151] Meyerson, above n 149, 113.
[152] Fuller, above n 118, 97.
[153] Ibid, 106.
[154] Ibid, 108.
[155] Ibid, 63.
[156] See Meyerson, above n 149, 125; Brunnée and Toope, above n 54, 29-30.
[157] Fuller, above n 118, 39-41.
[158] Ibid, 129.
[159] Ibid.

through reasoning and interaction with law that a sense of 'fidelity' to law (or, in their words, 'legal obligation') is created.[160]

Fuller identifies eight procedural conditions that enable the creation of laws that citizens can reason with and are necessary for promoting fidelity to law as a system.[161] Brunnèe and Toope have taken these 'criteria of legality' and integrated them into interactional law theory as the second key element:

- *The generality of law*: there must be a rule that prohibits, permits or requires certain conduct.[162]
- *Promulgation*: Law must be made generally available so that the subjects of the law are aware of the existence of the law and what it requires.[163]
- *Retroactive laws*: Laws should not be imposed retrospectively as laws enacted in the future cannot influence conduct in the present.[164]
- *The clarity of laws*: The content of law must be clear so that subjects can understand what is required of them to comply.[165]
- *Contradictions in the laws*: Laws should not contradict one another by simultaneously requiring and prohibiting the same conduct.[166]
- *Laws requiring the impossible*: Laws should not demand the impossible in that the conduct required by law must be realistic and capable of being carried out.[167]
- *Constancy of the laws through time*: The law should not be changed too frequently.[168]
- *Congruence between official action and declared rule*: Actors responsible for creating and/or enforcing the law must also act in congruence with the law.[169] In the words of Fuller, there should be no 'discrepancy between the law as declared and as actually administered.'[170]

In some respects, these criteria bring to mind those used by Franck to measure the degree of legitimacy of rules of international law.[171] Franck's indicators of legitimacy primarily focus on

[160] Brunnée and Toope, above n 54, 21-22.
[161] Fuller, above n 118, 96.
[162] Ibid, 46-49; Brunnée and Toope, above n 54, 26.
[163] Fuller, above n 118, 49-51; Brunnée and Toope, above n 54, 26.
[164] Fuller, above n 118, 51-62; Brunnée and Toope, above n 54, 26.
[165] Fuller, above n 118, 63-65; Brunnée and Toope, above n 54, 26.
[166] Fuller, above n 118, 65-70; Brunnée and Toope, above n 54, 26.
[167] Fuller, above n 118, 70-79; Brunnée and Toope, above n 54, 26.
[168] Fuller, above n 118, 79-81; Brunnée and Toope, above n 54, 26.
[169] Fuller, above n 118, 81-91; Brunnée and Toope, above n 54, 26.
[170] Fuller, above n 118, 81.
[171] See 3.3.2 above.

the procedure through which norms of international law are made (i.e. rules about making rules). In contrast, Fuller's criteria of legality focus on the content and operation of the legal norms. However, unlike Franck, Fuller posited these criteria in a general sense, not in the specific context of international law.

Brunnèe and Toope adapt Fuller's criteria to explain the creation and role of legal obligation in the context of international law. In their view, adherence to Fuller's criteria of legality distinguishes legal norms from social norms.[172] They state that '[w]hen the eight criteria of legality are met, actors will be able to reason with rules because they will share meaningful standards.'[173] As such, norms that adhere to the eight criteria of legality will generate 'fidelity to law' or, in their own words, a sense of 'legal obligation'.[174] That is, legal norms will tend to attract their own adherence regardless of the existence of enforcement mechanisms.[175] This is because norms that satisfy the eight criteria of legality are legitimate in eyes of the law's subjects.[176] This understanding of international law focuses on the horizontal characteristics that enable it to function, as opposed to depicting law as dependant on a 'top-down' application of authority and power.[177] Fuller's criteria of legality are therefore well-suited for understanding the creation of legitimate legal norms in international law, which lacks the centralised enforcement mechanisms and authoritative hierarchy of domestic legal systems.[178]

3.4.3 Practice of legality

In order for a sense of legal obligation to be generated and maintained, it is not enough that legal norms are created so that there are shared social understandings as to their purpose (element 1) and also substantially meet the eight criteria of legality (element 2).[179] According to Brunnèe and Toope, there must also be a continuing 'practice of legality'.[180] This requires that the activities and practices of international actors are congruent with an existing legal norm.[181] Moreover, the practice must also uphold and reinforce the criteria of legality as set

[172] Brunnée and Toope, above n 54, 26-27. Brunnée and Toope claim that '[f]or international society, some distinction between legal obligations and broader social norms is crucial in upholding an admittedly weal rule-of-law tradition.'
[173] Ibid, 312.
[174] Ibid.
[175] Ibid.
[176] Brunnée and Toope, above n 54, 312.
[177] Ibid, 311.
[178] Brunnée and Toope, above n 54, 6.
[179] Brunnée and Toope, *Interactional International Law*, above n 129, 312;
[180] Brunnée and Toope, above n 54, 6-7; Brunnée and Toope, *Interactional International Law*, above n 129, 312-313.
[181] Brunnée and Toope, *Interactional International Law*, above n 129, 313.

out above.[182] Activities that reinforce practice of legality include 'legal argumentation, interpretation, implementation or enforcement measures.'[183]

Practice of legality means that laws cannot simply be declared and then left idle. According to Brunnèe and Toope, laws must be continuously maintained through a practice of legality.[184] Without this practice, laws may only amount to being 'paper norms', in that they exist in writing (i.e. are enshrined in formal sources) but have no influence over the actual behaviour of state and non-state actors.[185] Legal norms that are not 'practiced' can also fall into disuse or be undermined and reshaped by contrary practice.[186] The participation of actors in creating and maintaining legal norms is therefore key to the development of legal obligation.[187] This links back to the concept of communities of practice discussed above – they provide a forum to facilitate a mutual and sustained practice of legality between state and non-state actors.

Interactional law theory provides a lens to assess the general capacity of the no-harm rule to promote compliance. This project analyses the no-harm rule against the elements of shared understandings, criteria of legality and practice of legality to determine how strong a sense of legal obligation, and hence compliance pull, it would likely exert over states in the context of future attempts at SAI. From this assessment, this research recommends how the no-harm rule might be developed to enhance the likelihood of compliance.

3.4.4 Interactional law theory and customary international law

Interactional law theory provides a new approach for specifically considering the way in which rules of *customary* international law influence the behaviour of state and non-state actors. As mentioned above, traditional doctrinal approaches to customary international law do not satisfactorily explain the way in which customary rules are formed or the role that it plays in international governance. In particular, they do not satisfactorily explain the formation and role of *opinio juris*- the belief that a certain practice is required by law. To borrow the words of Brunnèe and Toope '[h]ow is one to understand the idea that an abstract entity like a state 'believes' something? How is the belief to be proved?'[188] *Opinio juris* is typically inferred from

[182] Brunnée and Toope, *Interactional International Law*, above n 129, 313.
[183] Jutta Brunnée, 'The Sources of Interactional Environmental Law: Interactional Law ' in Samantha Besson and d'Aspremont (eds), *Oxford Handbook on the Sources of International Law* (2017- Forthcoming) 1, 4.
[184] Brunnée and Toope, above n 54, 352.
[185] Brunnée and Toope, *Interactional International Law*, above n 129, 313.
[186] Brunnée and Toope, above n 54, 352-353.
[187] Ibid, 353.
[188] Brunnée and Toope, above n 54, 47.

the existence of widespread concurrent practice, thereby overlapping with the requirement for state practice.[189] Such accounts therefore do not clearly distinguish what *opinio juris* is.

Few detailed, alternative accounts of customary international law have been provided by international relations theorists. Goldsmith and Posner provide an account of customary international law based on IR realist theories and rational choice theory. In their view, states comply with customary international law *only* out of material self-interest.[190] Customary international law either coincides with the material self-interests of a number of states, or strong states coerce weaker states to comply.[191] In this view, customary international law cannot independently influence the behaviour of states.[192] Moreover, the very existence of customary international law is based on the interests of states, and not an independent belief that a law should be complied with.[193] In other words, *opinio juris* is nothing more than a legal fiction. Guzman takes an alternative approach. He suggests that customary law can independently influence the behaviour of states by affecting 'state payoffs' (i.e. the benefit or cost of behaviour).[194] Guzman nevertheless notes that they do this *because they are considered to be law*.[195] In Guzman's view, whether a norm is a legal norm relates to the magnitude of consequences attached to non-compliance – legal norms have more significant consequences that non-legal norms.[196] This generates an increased expectation of compliance amongst states.[197] According to Guzman, *opinio juris* is merely a belief or expectation held by *other* states that 'the acting state has a legal obligation.'[198] It is this belief of other states that alters the payoff of compliance.[199] These two accounts therefore only offer explanations of customary international law based on the logic of consequence.

Interactional law theory offers an account of customary international law based on the logic of appropriateness. According to Brunnèe and Toope:

> The interactional theory shows that a social norm, reflecting a shared understanding that meets the criteria of legality is upheld through practice that is congruent with the norm. This

[189] Jack L. Goldsmith and Eric A. Posner, 'A Theory of Customary International Law' (1999) 66(4) *The University of Chicago Law Review* 1113, 1117-1118.
[190] Ibid, 1115.
[191] Ibid.
[192] Guzman, above n 36, 188.
[193] Goldsmith and Posner, 'A Theory of Customary International Law', above n 189.
[194] Guzman, above n 36, 190.
[195] Ibid, 191.
[196] Ibid, 193.
[197] Ibid.
[198] Ibid, 195.
[199] Ibid.

> constitutes a 'practice of legality.' This enriched form of practice is what would traditionally have been called *opinio juris*.[200]

Interactional law theory therefore provides an explanation of *opinio juris* that sufficiently distinguishes it from ordinary state practice, thereby providing a clearer account of customary international law. It does not purport *opinio juris* to be a legal fiction. Nor does it distort the meaning of *opinio juris* by rationalising its role on the basis of material interest. In this sense, interactional law theory provides an explanation of customary international law that is more sympathetic to the traditional understandings of *opinio juris*. That is, the idea of *opinio juris* as 'a [subjective] belief that [a] practice is rendered obligatory by the existence of a rule of law requiring it.'[201]

Interactional international law is a relatively new approach. Brunnèe and Toope published this theory in 2010 in their book *Legitimacy and Legality in International Law*. In this book, they apply interactional law theory to the UNFCCC regime, the prohibition against torture and the prohibition against the use of force. The case studies therefore largely focus on rules of international treaty law.[202] Moreover, interactional law theory has not been widely considered or applied beyond the work of its creators. This project takes the opportunity to 'test' this theory. It therefore takes a critical approach to applying interactional law theory to the no-harm rule. It reflects on how useful this theory is to analysing rules of customary international law such as the no-harm rule, as well as any limitations or difficulties.

3.4 CONCLUSION

This chapter explained the methodological and theoretical approaches used in this project to address the research aims and specific research questions. Doctrinal legal analysis will be employed throughout chapters four, five and six to establish the content of the no-harm rule and considers how it has evolved over time. Chapter seven engages in the next step of doctrinal analysis by considering how the no-harm rule would likely apply to future attempts at SAI. Interactional law theory will be used in chapter eight to assess the extent to which the no-harm rule is likely to promote a 'compliance pull' over states, should they decide to engage in field testing or full scale deployment of SAI. By combining these two approaches, this project aims

[200] Brunnée and Toope, above n 54, 47.
[201] *North Sea Continental Shelf (Federal Republic of Germany v Denmark; Federal Republic of German v Netherlands)* (1969) ICJ Rep 3, 44.
[202] The prohibition against torture is codified within the *Convention against Torture and Other Cruel, Inhuman or Degrading Treatment or Punishment*, opened for signature 26 June 1987, 1465 UNTS 113 (entered into force 26 June 1987).

to develop a comprehensive understanding of the role of the no-harm rule in international environmental governance and recommend how it might be developed to better contribute to international environmental governance in the future.

4 Phase One of the Development of the No-Harm Rule 1938-1972: Duty Not to Cause Transboundary Harm to Other States

4.1 INTRODUCTION

The no-harm rule is widely recognised as a principle of customary international law. The significance of this status is that the no-harm rule is binding on all states. As a binding rule of customary international law, the no-harm rule might enable international law to respond to the threats of transboundary harm and harm to the atmosphere posed by SRM geoengineering in the absence of a specific international agreement on the topic. As mentioned in chapter two, legal scholars recognise that the no-harm rule could form the basis for states to hold other states responsible if they attempt SAI and cause transboundary harm and/or harm to the global commons.[1] However, there has been little consideration of the potential of the no-harm rule to provide a form of *ex ante* governance of SAI to respond to the risks of SAI before they materialise. The potential of the no-harm rule to contribute to the international governance of SAI in this manner warrants greater consideration.

This chapter is the first of three that examine the historical development of the no-harm rule as a principle of customary international law. Analysing the historical development is crucial for engaging in doctrinal legal analysis of the rule. As previously discussed, doctrinal legal analysis is the traditional approach used by legal scholars researching legal concepts and principles.[2] It can best be described as a two part process: the first part is to locate the law in relevant sources; the second part is to interpret and analyse these sources to determine the content of the rule and how it might apply to a problem.[3] According to Hutchinson and Duncan, the first part of doctrinal research is to essentially determine the 'objective reality' of the law.[4] This is not to

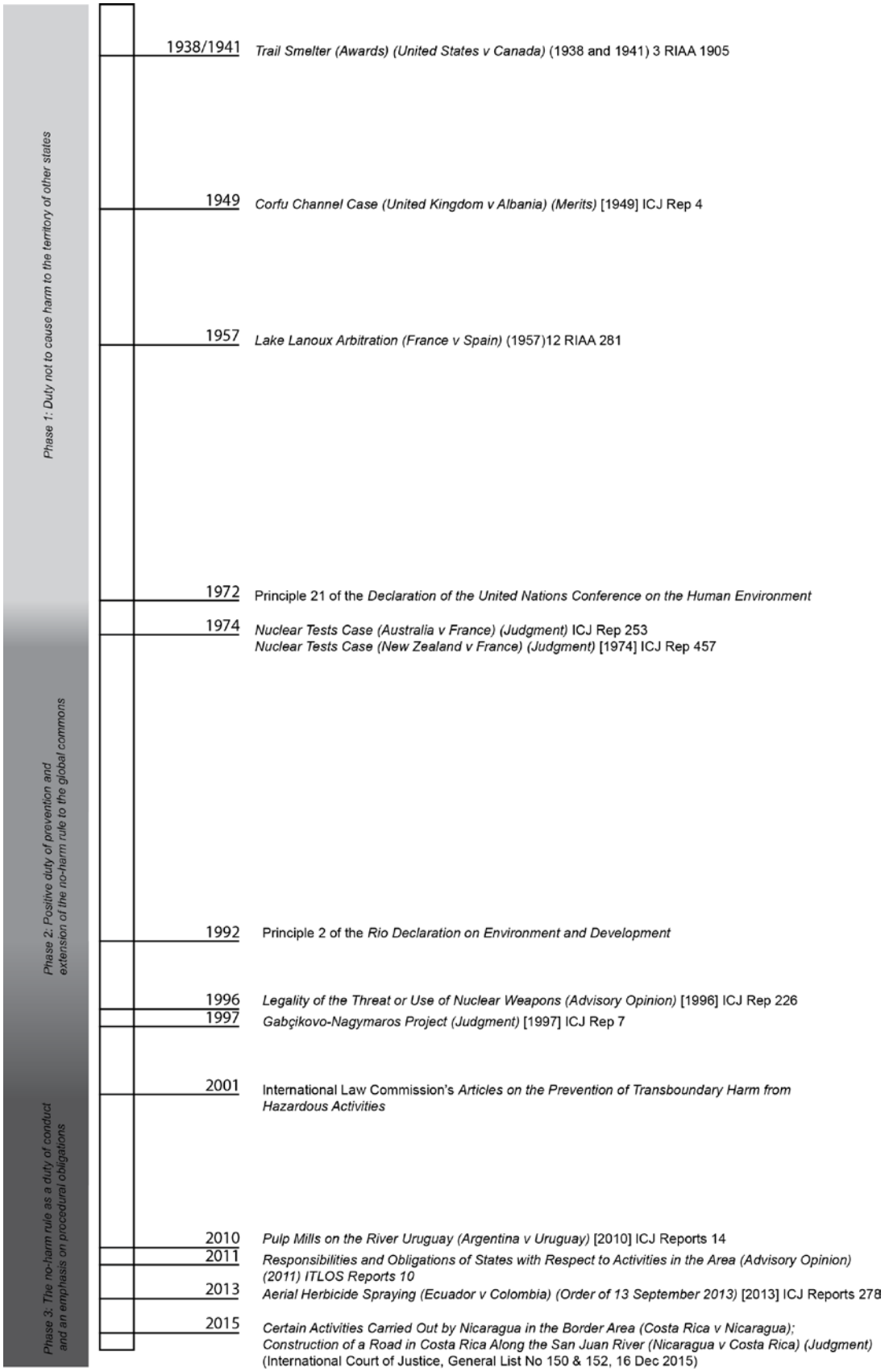
[1] See Barbara Saxler, Jule Siegfried and Alexander Proelss, 'International liability for transboundary damage arising from stratospheric aerosol injections' (2015) 7(1) *Law, Innovation and Technology* 112. See also David Reichwein et al, 'State Responsibility for Environmental Harm from Climate Engineering' (2015) 5(2-4) *Climate law* 142.
[2] Terry Hutchinson and Nigel Duncan, 'Defining and Describing What We Do: Doctrinal Legal Research' (2012) 17(1) *Deakin Law Review* 83, 84. See also Chapter 3.2.
[3] Ibid, 110-111; Terry Hutchinson, 'Doctrinal Research- Researching the Jury' in Dawn Watkins and Mandy Burton (eds), *Research Methods in Law* (Routledge, 2013) 726, 13. See also Adilah Abd Razak, 'Understanding Legal Research' (2009) 4 *Integration & Dissemination* 19, 20.
[4] Hutchinson and Duncan, above n 2, 110. See also Terry Hutchinson, *Research and Writing in Law* (Thompson Reuters (Professional) Australia 3rd ed, 2010) 37.

say that that there is a settled or objective understanding of the law.[5] Instead, the first step of legal doctrinal analysis is to merely establish a positive statement of the law, such as law contained in the text of domestic legislation.[6] This step is more complicated in the case of customary international law as it is formed by congruent state practice over time and the *opinio juris* of states.[7] Customary international law is therefore evidenced in multiple sources. It also continues to develop over time. Consequently, in order to establish what the no-harm rule *is* at the present time, it is necessary to trace its development. The historical analysis of the no-harm rule over the next three chapters therefore provides the necessary foundations for interpreting and applying the no-harm rule to the future use of SAI.

The timeline below provides a visual representation of the development of the no-harm rule as a principle of customary international law through key sources. Each source has been selected because it represents a turning-point in the development of the no-harm rule and/or has significantly contributed to how legal scholars, jurists and states understand the content of the no-harm rule. The decisions of international courts and tribunals are prominent in this analysis. They are not primary sources of international law in accordance with article 38 of the *Statute of the International Court of Justice*. However, as Birnie, Boyle and Redgwell note, they 'provide the most authoritative guidance on the state of the law at the time they are decided.'[8] The timeline begins with the *Trail Smelter* arbitration[9]: the first judgment of an international court or tribunal that recognised the no-harm rule. The timeline continues to the present day (2016) and is scaled to represent the number of years between each source.

[5] Hutchinson and Duncan, above n 2, 110. Hutchison and Duncan note that critical legal scholars would be quick to point out that many legal norms are contested.
[6] Hutchinson and Duncan, above n 2, 110.
[7] *Statute of the International Court of Justice* art 38(1). See also *North Sea Continental Shelf (Federal Republic of Germany v Denmark; Federal Republic of German v Netherlands)* (1969) ICJ Rep 3, 44 in which the ICJ confirmed that both elements are necessary for the formation of customary international law. This understanding of customary international law is consistent with that of the earlier Permanent Court of International Justice. See *Case of the SS Lotus (France v Turkey)* (1927) PCIJ (series A) No 10, 18.
[8] Patricia Birnie, Alan Boyle and Catherine Redgwell, *International Law and the Environment* (Oxford Univerity Press, 3rd ed, 2009) 140. See also J G Lammers, *Pollution of International Watercourses: A Search for Substative Rules and Principles of Law* (Martinus Nijhoff 1984), 504. Lammers notes that the decisions of international courts and tribunals are often invoked by states 'as evidence of what the rules and principles of international law are on a given point'.
[9] *Trail Smelter (United States v Canada) (Awards)* (1938 and1941) 3 RIAA 1905.

Figure 4.1 Timeline of the development of the no-harm rule in key sources



This timeline divides the development of the no-harm rule into three phases. The first phase begins with the *Trail Smelter* arbitration in 1938/1941. In this phase, the no-harm rule developed so as to apply to transboundary harm to the territory of other states. The second phase begins in 1972 with principle 21 of the *Stockholm Declaration*. In this phase, the no-harm rule was further developed to extend beyond the territorial jurisdiction of states to also include harm to the global commons. This phase is also characterised by a growing emphasis on the no-harm rule as a positive duty to prevent harm, rather than merely as a means of responding to harm after it has been caused. The commencement of the third phase is marked by the ILC's 2001 *Draft Articles on the Prevention of Transboundary Harm from Hazardous Activities*.[10] This phase is distinguished by the no-harm rule being largely characterised as a 'duty of conduct' or 'due diligence' obligation. Consequently, there is a strong focus in key sources on the procedural obligations that flow from the no-harm rule.

This chapter examines the first phase in the development of the no-harm rule: the duty not to cause transboundary harm to the territory of another state. Following this introduction, 4.2 examines the seminal decision of the International Arbitration Tribunal in the 1938/1941 *Trail Smelter* arbitration. Section 4.3 examines how the International Court of Justice's judgment in the 1949 *Corfu Channel* case contributed to the development of this rule. Section 4.4 analyses the way in which the decision in the 1959 *Lake Lanoux* arbitration contributed to the early understanding of the no-harm rule.

4.2 1938 AND 1941: TRAIL SMELTER CASE (UNITED STATES V CANADA)

The origins of the no-harm rule can be traced back to the 1938/1941 *Trail Smelter* arbitration.[11] This case was the first time that an international tribunal recognised the negative transboundary consequences of air pollution.[12] It was also the first time an international tribunal recognised the duty not to cause serious transboundary harm.[13] A number of legal scholars have questioned its present value as precedent, as the arbitration was triggered by a bilateral agreement and the decision relied heavily on US domestic law.[14]Nevertheless, as the first case to articulate the

[10] 'Draft Articles on Prevention of Transboundary Harm from Hazardous Activities, with Commentaries' (2001) II(2) *Yearbook of the International Law Commission*, 149 ('*Draft Articles on Prevention*').
[11] *Trail Smelter (Awards)* (1938 and1941) 3 RIAA 1905.
[12] Philippe Sands and Jacqueline Peel, *Principles of International Environmental Law* (Cambridge University Press, 3rd ed, 2012), 4.
[13] *Trail Smelter (Awards)* (1938 and1941) 3 RIAA 1905.
[14] See, eg, Birnie, Boyle and Redgwell, above n 8, 144; Allen L Springer, *Cases of Conflict: Transboundary Disputes and the Development of International Environmental Law* (University of Toronto Press, 2016) 24-28; Jaye Ellis, 'Has International Law Outgrown *Trail Smelter*? ' in Rebecca M Bratspies and Russell A Miller

no-harm rule, the *Trail Smelter* arbitration is therefore the logical starting point for considering the development of the no-harm rule.

4.2.1 Background to the arbitration

This case concerned transboundary air pollution produced by a zinc and lead smelter. The smelter was owned by the Consolidated Mining and Smelting Company of Canada Limited, near the town of Trail in British Colombia, Canada. The Consolidated Mining and Smelting Company of Canada (the Company) acquired the smelter in 1906.[15] Over the next three decades, the Company developed the Trail Smelter, until it became 'one the best and largest equipped smelting plants' on the North American continent.[16] The company added two tall smoke stacks in 1925 and 1927, thereby increasing the amount of zinc and lead ore that it could process.[17] This also increased the amount of air pollution produced by the smelter. By 1930, the Trail Smelter was emitting approximately 600-700 tons of sulphur dioxide daily into the atmosphere.[18] The Trail Smelter is located on the Colombia River about 11km (7 miles) north of the border with the US state of Washington.[19] The surface wind at Trail tended to blow from the northeast down the river valley.[20] As a result, the wind carried sulphur dioxide fumes from the Trail Smelter across the border into Stevens County in Washington State.[21]

From 1925, residents in Stevens County, Washington began to complain that fumes from the Trail Smelter were causing damage to their property.[22] The Company settled a number of early complaints directly with property owners.[23] In 1927, the US Government officially took up the matter on behalf of its citizens.[24] In 1928, the US and Canadian Governments jointly referred the issue of transboundary air pollution to the International Joint Commission for investigation. The International Joint Commission issued its report in 1931. The report recommended that Canada pay the US compensation in the sum of $350,000 for damage caused by fumes from

(eds), *Transboundary Harm in International Law: Lessons from the Trail Smelter Arbitration* (Cambridge University Press, 2006) 56; Karin Mickelson, 'Rereading Trail Smelter ' in Rebecca M Bratspies and Russell A Miller (eds), *Transboundary Harm in International Law: Lessons from the Trail Smelter Arbitration* (Cambridge University Press, 2006) 79

[15] *Trail Smelter (Awards)* (1938 and1941) 3 RIAA 1905, 1917.
[16] Ibid.
[17] Ibid.
[18] Ibid.
[19] Ibid, 1913.
[20] Ibid, 1914. The decision of the Tribunal contains more detail about the prevailing wind conditions in the area, including seasonal variations (at 1923-1924).
[21] Ibid, 1917.
[22] Ibid.
[23] Ibid.
[24] Ibid, 1918.

the Trail Smelter.[25] The report also made recommendations for the settlement of future claims for damages from citizens, and suggested that the Company take measures to reduce the amount of sulphur dioxide produced by the smelter.[26] Nevertheless, the problem of transboundary air pollution persisted, and in 1933 the US recommenced diplomatic negotiations with Canada.[27]

On the 15th April 1935, the US and Canada concluded the *Convention for Settlement of Difficulties Arising from Operation of Smelter at Trail, B.C* (‘*Convention for Settlement*’) to permanently settle the dispute.[28] Under article II, the US and Canada agreed to refer the question of transboundary harm from 1932 onwards to an international tribunal for arbitration. Article III of the *Convention for Settlement* set out four questions that were addressed by the Tribunal. First, the Tribunal had to determine whether the Trail Smelter had caused damage to the state of Washington since the 1st January 1932.[29] Second, if damage was established, the Tribunal was then asked to decide ‘whether the Trail Smelter should be required to refrain from causing damage in the State of Washington in the future and, if so, to what extent?’[30] Third, the Tribunal was asked to establish a regime for the future management of air pollution from the Trail Smelter.[31] Fourth, the Tribunal was to consider what compensation (if any) should be paid in the event of future harm from the smelter.[32] Under article IV of the *Convention of Settlement*, the Tribunal was to ‘apply the law and practice in dealing with cognate questions in the United States of America as well as international law and practice’ to answer the questions before it.[33]

4.2.2 Decision of the Tribunal

The US claimed that fumes from the Trail Smelter had caused damage to land and property in Washington State. It specifically claimed damages in respect of: cleared land and improvements thereon; uncleared land and improvements thereon; livestock; urban property; and business enterprises.[34] The Tribunal considered these claims when addressing the first

[25] *Trail Smelter (Awards)* (1938 and1941) 3 RIAA 1905, 1918. This amount was for all damages up to and including the first day of January 1932.
[26] Ibid.
[27] Ibid.
[28] *Convention for Settlement of Difficulties Arising from Operation of Smelter at Trail B.C.*, United States-Canada, opened for signature 15 April 1935, 893 U.S. Treaty Series (entered into force 3 August 1935)
[29] The Tribunal was also asked to determine the amount of compensation that should be paid for such damage.
[30] *Convention for Settlement of Difficulties Arising from Operation of Smelter at Trail B.C.*, United States-Canada, opened for signature 15 April 1935, 893 U.S. Treaty Series (entered into force 3 August 1935) art 111(2).
[31] Ibid, art III(3).
[32] Ibid, art III(4)
[33] Ibid, art V.
[34] *Trail Smelter (Awards*) (1938 and 1941) 3 RIAA, 1905, 1920.

question as to whether the Trail Smelter had caused damage to Washington State. The Tribunal found that fumes from the Trail Smelter had caused damage to cleared land in the form of reduced crop yields.[35] The Tribunal also found that damage had been caused to uncleared land, specifically to 200 acres of wild pasture land immediately adjoining the boundary with Canada[36] and to timber land.[37] The Tribunal was not satisfied that damage had been caused to livestock independently from the impact of reduced crop or grazing yield.[38] The Tribunal was also not satisfied that damage had been caused to urban property, or that the fumes from the Trail Smelter had caused economic damage to business enterprises in the area.[39]

As some of the claims for damage were established, the Tribunal proceeded to consider the second question before it, namely whether the Trail Smelter *should* refrain from causing damage in the future. That is, whether there was a rule in international law that prohibited this type of conduct. The Tribunal briefly considered the *Alabama* case[40] and the writings of legal scholars to demonstrate that states have a general duty under international law to 'respect other States and their territory'.[41] However, there was no jurisprudence in international law that specifically dealt with the issue of transboundary air pollution or transboundary water pollution.[42] As such, the Tribunal drew on decisions by the US Supreme Court concerning air and water pollution to inform its assessment as to whether the Trail Smelter should be required to refrain from causing future harm. The Tribunal held these decisions 'may legitimately be taken as a guide in this field of international law.'[43] It further stated that 'the law followed in the United States in dealing with the quasi-sovereign rights of the States of the Union, in the matter of air pollution, whilst more definitive, is in conformity with the general rules of international law.'[44] Given that the Parties had previously agreed to the application of United States law to resolve the dispute, the Tribunal's deference to precedent from the United States Supreme Court was not contentious in the context of the dispute.[45]

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[35] *Trail Smelter (Awards*) (1938 and 1941) 3 RIAA, 1905, 1924.
[36] Ibid, 1926.
[37] Ibid, 1927-1931.
[38] Ibid, 1931.
[39] Ibid.
[40] Ibid, 1963; *Alabama Claims (United States v Great Britain) (Awards)* (1871) XXIX RIAA 125.
[41] *Trail Smelter (Awards*) (1938 and 1941) 3 RIAA, 1905, 1963.
[42] Ibid.
[43] Ibid, 1964.
[44] Ibid.
[45] Stephen C McCaffrey, 'Of Paradoxes, Precedents, and Progeny: The Trail Smelter Arbitration 65 Years Later ' in Rebecca M Bratspies and Russell A Miller (eds), *Transboundary Harm in International Law: Lessons from the Trail Smelter Arbitration* (Cambridge University Press, 2006) 34, 36; *Convention for Settlement of Difficulties Arising from Operation of Smelter at Trail B.C.*, United States-Canada, opened for signature 15 April 1935, 893 U.S. Treaty Series (entered into force 3 August 1935) art IV.

It was on the basis of decisions of the United States Supreme Court that the Tribunal famously pronounced:

> [U]nder the principles of international law, as well as the law of the United States, no State has the right to use or permit the use of its territory in such a manner as to cause injury by fumes in or to the territory of another or the properties or persons therein, when the case is of serious consequence and the injury is established by clear and convincing evidence.[46]

The Tribunal consequently held that the Trail Smelter must not cause further damage through fumes to Washington State.[47] It further stated that it is the 'duty of the Government of the Dominion of Canada to see to it that this [the Company's] conduct should be in conformity with the obligation of the Dominion under international law'.[48] In other words, Canada was ultimately responsible for the conduct of the operators of the Trail Smelter.[49]

In response to question three, the Tribunal decided it was necessary to establish a management regime for the Trail Smelter in order to prevent further transboundary damage occurring in Washington State.[50] The Tribunal had employed technical consultants over a period of three years to investigate the operation of the Trail Smelter and the prevailing meteorological conditions in the area.[51] Drawing on information provided by the technical consultants, the Tribunal set out the content of the management regime in its decision. The regime required the operators of the Trail Smelter to monitor and record meteorological conditions in the area as well as measure the concentration of sulphur dioxide emissions.[52] The Trail Smelter was required to provide this information to the governments of Canada and the United States on a monthly basis.[53] The regime also set a daily limit on the allowable amount of sulphur dioxide emissions, taking into account seasonal variations in weather, and the prevalence of rain, snow, wind and turbulence.[54] The Tribunal was confident that this regime would resolve the issue of transboundary damage via fumes from the Trail Smelter.[55] However, addressing the fourth question of indemnity for future harm, the Tribunal nevertheless concluded that if fumes from the Trail Smelter should cause damage to Washington State in the future, 'an indemnity shall be paid for such damage but only when and if the two Governments shall make arrangements

[46] *Trail Smelter (Awards)* (1938 and 1941) 3 RIAA 1905, 1965.
[47] Ibid, 1966.
[48] Ibid.
[49] Ibid, 1965-1966.
[50] Ibid, 1966.
[51] Ibid.
[52] Ibid, 1974-1978.
[53] Ibid, 1975.
[54] Ibid, 1975-1977.
[55] Ibid, 1980.

for the disposition of claims for indemnity'.[56] In other words, adherence to the regime would not necessarily absolve the Trail Smelter from liability for future damage.

4.3.3 Significance of the Trail Smelter arbitration

As noted above, the tribunal in the *Trail Smelter* arbitration affirmed the existence of the 'no-harm' rule in international law. According to Nanda and Pring, this set the stage for the further development of rules and principles in international law concerning transboundary pollution.[57] The Tribunal held that states do not have a right under international law to cause *serious* harm to the territory of other states. The Tribunal's decision therefore indicated a threshold level of 'serious' harm. That is, states have a right to engage in activities that cause transboundary harm so long as the severity of harm is below this threshold. Furthermore, the Tribunal's decision with regard to question four suggested that the standard of care under the no-harm rule is a 'duty of result'. Namely, that states may be held liable for transboundary harm regardless of whether appropriate preventative measures have been taken. Some legal scholars have suggested the alternative – that the decision implies a duty of conduct or due diligence.[58] However, as noted by Goldie, the Tribunal imposed liability on Canada without proof of fault.[59] This weighs heavily in favour of a duty of result (i.e. a standard of care of strict liability).

The particular context of the *Trail Smelter* arbitration must be taken into account when evaluating its precedential value in the present day. The Tribunal's reliance on US domestic sources to interpret rules of international law has been heavily criticised by legal scholars. It has been suggested that the Tribunal was incorrect to assume that US law reflected international law at the time. According to McCaffrey, this was 'a rather large analytical leap' because no positive international law existed to form the basis of this assumption.[60] Ruben similarly suggests that the Tribunal's analogy between states in international law and states in the US

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[56] *Trail Smelter (Awards)* (1938 and 1941) 3 RIAA 1905, 1980.
[57] Ved P Nanda and George (Rock) Pring, *International Environmental Law and Policy for the 21st Century* (Martinus Nijhoff Publishers 2ed, 2013) 81-82.
[58] See *Draft Articles on Prevention*, above n 10. The commentaries to the Draft Articles imply that the *Trail Smelte*r arbitration set this standard of care, stating that the Trail Smelter established a 'principle of prevention'. See also Timothy Stephens, *International Courts and Environmental Protection* (Cambridge University Press, 2009) 133; Pierre-Marie Dupuy and Cristina Hoss, 'Trail Smelter and Terrorism: International Mechanisms to Combat Transboundary Harm' in Rebecca M Bratspies and Russell A Miller (eds), *Transboundary Harm in International Law: Lessons from the Trail Smelter Arbitration* (Cambridge University Press 2006) 225, 227-230. Dupuy and Hoss qualify this interpretation of the Trail Smelter arbitration, describing it as a 'reactionary approach' to due diligence, compared to the more proactive approach set out by the ILC in the 2001 *Draft Articles on Prevention*. But see Sands and Peel, above n 12, 712. Sands and Peel suggest that this case can be interpreted both ways.
[59] L. F. E. Goldie, 'Liability for Damage and the Progressive Development of International Law' (1965) 14(4) *The International and Comparative Law Quarterly* 1189, 1230.
[60] McCaffrey, above n 45, 36.

federal system was inaccurate.[61] Ruben criticises the Tribunal for not properly examining whether US case law at that time was an appropriate reflection of international law.[62] The Tribunal's reliance on US domestic law is therefore important to keep in mind when considering the contribution of the *Trail Smelter* arbitration to the development of the no-harm rule.

It is also important to acknowledge that the Trail Smelter arbitration was litigated on the basis of a pre-existing bilateral treaty. According to Stephens, the importance of the *Trail Smelter* arbitration is often overstated by legal scholars as they do not give appropriate consideration to this context.[63] Stephens claims that 'frequent reference to the case conveys a misleading impression that transboundary pollution cases are routinely and effectively resolved by inter-state dispute settlement.'[64] Okowa further notes that the *Convention for Settlement* narrowed the focus of the tribunal, causing it to primarily consider apportionment of damage, rather than the formulation of general rules of international law.[65] Nevertheless, legal scholars have generally accepted that the Tribunal's finding expresses the state of customary international law in the first half of the 20th century; namely, that states do not have the right to cause serious injury to the territory of others.[66]

4.3 1949: THE CORFU CHANNEL CASE (UNITED KINGDOM V ALBANIA)

Eight years after the *Trail Smelter* arbitration, the International Court of Justice (ICJ) handed down its judgment in the *Corfu Channel* case.[67] Unlike the *Trail Smelter* arbitration, the *Corfu Channel* case did not involve an issue of transboundary pollution. It concerned the sinking of British ships in Albanian waters. Nevertheless, the majority judgment of the ICJ is often cited by legal scholars as having affirmed the general duty to prevent transboundary harm as articulated by the Tribunal in the *Trail Smelter* arbitration.[68]

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[61] Alfred P Rubin, 'Pollution by Analogy: The *Trail Smelter* Arbitration [Abridged]' in Rebecca M Bratspies and Russell A Miller (eds), *Transboundary Harm in International Law- Lessons from the Trail Smelter Arbitraiton* (Cambridge University Press 2006) 46, 48-51.
[62] Ibid, 48-51.
[63] Stephens, above n 58, 124-125. This source has also provided stylistic inspiration for the layout for the source analyses in chapters four, five and six.
[64] Ibid, 124.
[65] Phoebe Okowa, *State Responsibility for Transboundary Air Pollution in International Law* (Oxford University Press, 2000) 67.
[66] See, eg, ibid 68; Nanda and Pring, above n 57;
[67] *The Corfu Chanel Case (United Kingdom v Albania) (Merits)* [1949] ICJ Rep 4.
[68] See, eg, Gillian D Triggs, *International Law: Contemporary Principles and Practices* (LexisNexis, 2006), 790; Okowa, above n 65, 68; Nanda and Pring, above n 57, 82;

4.3.1 Background to the dispute

In the *Corfu Channel* case, the ICJ addressed claims made by the United Kingdom and Albania concerning two related incidents. First, on 22 October 1946, four Royal British Navy ships were sailing northward through the Corfu Strait, between the Greek island of Corfu and the coast of Albania. Two of the ships, the *Saumarez* and the *Volage*, struck sea mines in Albanian waters. The explosions heavily damaged both ships, killing 44 crew members and injuring a further 42.[69] In accordance with a special agreement concluded between the United Kingdom and Albania, the ICJ was asked to determine whether Albania was responsible under international law for the explosions and the resulting damage and loss of life, and also whether Albania had a duty to compensate the United Kingdom for this harm.[70]

The United Kingdom claimed that Albania was responsible for the minefield: either it had been deliberately laid by the Albanian Government between 15 May and 22 October 1946, or alternatively that the Albanian Government knew of the existence of the minefield within its territorial waters.[71] The United Kingdom further claimed that the Albanian Government had failed to warn of the existence of the minefield, even though it knew that British ships were passing through the area.[72] The United Kingdom therefore argued that Albania had breached its international legal obligations and was required under international law to make reparations for the damage to British ships and the consequential loss of life and injury to their crews.[73] In response, Albania claimed that it could not be established that it had laid the mines, had caused a third party to lay the mines on its behalf, or knew that the mines were in its territorial waters.[74] It therefore argued that it could not be held responsible for the consequences of the explosions and, hence, was not obliged to pay compensation to the United Kingdom.[75]

The second incident that was considered by the ICJ took place shortly after on 12-13 November 1946. In response to the explosions, the British Royal Navy conducted mine sweeping operations in Albanian waters without the consent of the Albanian Government.[76] Albania claimed that, in doing so, the United Kingdom had breached its international legal obligations

[69] *The Corfu Chanel Case (United Kingdom v Albania) (Merits)* [1949] ICJ Rep 4, 10.
[70] Ibid, 6.
[71] Ibid, 10.
[72] Ibid. Britain claimed that the failure to give warning of the minefield was a breach of the Hague Convention VIII of 1907.
[73] Ibid, 11.
[74] Ibid.
[75] Ibid.
[76] Ibid, 12.

by violating the territorial sovereignty of Albania.[77] The Court was therefore also asked to decide whether the United Kingdom had violated the sovereignty of Albania. However, the judgment of the ICJ in relation to this second incident is not considered further in this chapter, as it is does not contribute to the development of the no-harm rule.

4.3.2 Judgment of the ICJ and its contribution to the no-harm rule

The Court considered whether Albania was responsible for the explosions and the damage they caused to the British ships and crew. There was no evidence to suggest that Albania had laid the mines itself.[78] The Court also was not satisfied that the minefield had been laid by Yugoslavia in collusion with the Albanian Government.[79] However, the fact that the Albanian government was not involved in laying the minefield did not preclude responsibility from being established. The Court noted that the Albanian Government maintained strict control over the area where the minefield was located, therefore making it unlikely that it was ignorant of its existence.[80] Albanian authorities would also have been able to observe the minefield being laid from locations along the coastline.[81] The Court therefore concluded that the minefield could not have been laid without the knowledge of the Albanian Government.[82]

Given that the Albanian Government knew about the minefield, the Court also held that Albania had a duty under international law to notify and warn ships in the area. In support of this duty, the Court cited the *Hague Convention of 1907 No VIII relative to the Laying of Automatic Submarine Contact Mines*.[83] The Court also cited 'elementary considerations of humanity' and the 'principle of the freedom of maritime communication'.[84] Finally, the Court held that every state has an obligation 'not to allow knowingly its territory to be used for acts contrary to the rights of other States.'[85] This statement more closely resembles the longstanding legal maxim of *sic utero tuo ut alienum non laedas* (use your own property in such a way that

[77] *The Corfu Chanel* [1949] ICJ Rep 4.
[78] Ibid, 16.
[79] Ibid, 16-17.
[80] Ibid, 20.
[81] Ibid, 22.
[82] Ibid.
[83] *Hague Convention of 1907 No VIII relative to the Laying of Automatic Submarine Contact Mines*, opened for signature 17 October 1907, (entered into force 26 January 1907).
[84] *The Corfu Chanel* [1949] ICJ Rep 4, 22.
[85] Ibid.

you do not injure other people's).[86] However, it is also said to support the no-harm rule flowing from the *Trail Smelter* arbitration, even though the ICJ made no reference to that case.[87]

While the *Corfu Channel* case supported the existence of the no-harm rule, it did not further develop the rule's substantive content. It did not expand on the threshold level of harm, or clarify the types of harm that the no-harm rule might respond to. The majority of the court expressed the no-harm rule in the language of the rights of states, rather than referring to physical pollution or harm. Birnie, Boyle and Redgwell point out that despite this different framing, the ICJ did not provide further clarification as to what the rights of states were. [88] The decision certainly gave no indication as to what the rights of states were concerning environmental protection.[89]

The only relevant development stemming from the ICJ decision is the proposition that states, as part of their obligation not to commit acts contrary to the rights of other states, must warn other states of any imminent danger to their interests.[90] This is reflected in the contemporary procedural duty to notify and consult with other states, which is discussed in more detail in chapter six. However, this does not automatically mean that, during this phase, the ICJ interpreted the no-harm rule as providing states with an obligation of conduct or 'due diligence'. Goldie states that, as with the *Trail Smelter* arbitration, the ICJ imposed liability for harm on Albania without proof of negligence.[91]

4.4 1957: LAKE LANOUX ARBITRATION (SPAIN V FRANCE)

4.4.1 Background to the dispute

The dispute in the *Lake Lanoux* arbitration concerned the use of a shared waterway between France and Spain.[92] Lake Lanoux is located in the Pyrénées in France. Its waters flow into the

[86] *Overview: sic utero tuo ut alienum non laedas*, Oxford Reference, <http://www.oxfordreference.com/view/10.1093/oi/authority.20110803100504563> .
[87] See, eg, Okowa, above n 65, 68; Birnie, Boyle and Redgwell, above n 8, 144; Nanda and Pring, above n 57, 82.
[88] Birnie, Boyle and Redgwell, above n 8, 144. See also Lammers, above n 8, 526.
[89] Birnie, Boyle and Redgwell, above n 8, 144. See also Lammers, above n 8, 526; Stephens, above n 58, 123.
[90] See Nanda and Pring, above n 57, 82. See also, Birnie, Boyle and Redgwell, above n 8, 144.
[91] Goldie, above n 59, 1230. But see Lammers, above n 8, 527. According to Lammers, it can be inferred that the failure of Albania to warn the British ships was known to the Court, and that the Court therefore based Albania's responsibility on this omission.
[92] *Lake Lanoux Arbitration (France v Spain)* (1957) 24 ILR 101 ('*Lake Lanoux Arbitration*'). For further details of the background of this case, see Lammers, above n 8, 508-509.

River Carol which then flows from France into Spain.[93] The French Government proposed to divert water from Lake Lanoux away from the River Carol and into the River Ariège for the purpose of generating hydroelectricity.[94] They further proposed to redirect the same volume of water back to the River Carol via a tunnel so that the volume of water flowing into Spain was unaltered.[95]

Spain objected to France's proposal. Spain argued that the proposal would violate its rights under the 1866 *Treaty of Bayonne* and *Additional Act*.[96] The *Treaty of Bayonne* delineated the boundary between France and Spain in the Pyrénées area and also established shared water rights in this area.[97] Spain claimed that France's proposal breached these rights by unilaterally altering the waters of the River Carol. This is because, although France intended to restore the water to the River Carol, the flow of water would no longer be natural and would be subject to the control of France.[98] Spain further argued that France had a duty to consult with Spain and obtain its consent prior to beginning the project.[99] While Spain specifically asked the Court to decide this question on the basis of the *Treaty of Bayonne*, in its submissions, Spain also suggested that such a duty existed under customary international law. Spain referred to other treaties between co-riparian states to argue that France had a general duty to obtain the consent of Spain before altering a shared watercourse.[100] The dispute was submitted to international arbitration.

4.4.2 The decision and its relevance to the no-harm rule

In submitting the case for arbitration, Spain and France specifically asked the Tribunal to decide the dispute on the basis of the *Treaty of Bayonne*. They did not ask the Tribunal to determine and apply general principles of international law, including the no-harm rule.[101] The decision of the Tribunal therefore largely focuses on interpreting and applying the content of the *Treaty of Bayonne*. However, the Tribunal's analysis of two issues has some bearing on the no-harm rule as a principle of customary international law.

[93] *Lake Lanoux Arbitration* 24 ILR 101, 101-102. For further description of the background to the dispute, see Stephens, above n 58 166-168.
[94] *Lake Lanoux Arbitration* 24 ILR 101, 105-107.
[95] Ibid, 109-110.
[96] See ibid, 102-105.
[97] Ibid. See articles 8-19 as recorded in the award.
[98] Ibid, 112-114.
[99] Ibid, 113.
[100] Ibid, 112.
[101] Ibid, 121.

The first relevant issue was whether the proposed diversion and restoration of water into the River Carol by France 'altered' the waters of the River, and hence, violated Spain's rights under the *Treaty of Bayonne.* Spain did not allege that France's proposal would pollute the waters of the River Carol, nor change its chemical composition or temperature.[102] Spain also did not claim that the volume of the water in the river would be reduced.[103] The Tribunal held that France's proposal therefore would not 'alter' the waters of the River Carol.[104] That is, restitution of the water alone, without any other impacts, would not violate the rights of Spain under the *Treaty of Bayonne*.

In *obiter*, the Tribunal hypothetically considered the application of customary international law. The Tribunal stated that:

> [I]f it is admitted that there is a principle which prohibits the upstream State from altering the waters of a river in such a fashion as seriously to prejudice the downstream State, such a principle would have no application to the present case, because it has been admitted by the Tribunal, in connection with the first question examined above, that the French scheme will not alter the waters of the Carol.[105]

This statement is generally interpreted by legal scholars as having affirmed the no-harm rule as articulated by the Tribunal in the *Trail Smelter* arbitration.[106] This statement further suggests that mere utilisation of a shared resource may not be enough to qualify as 'harm' in order to trigger the no-harm rule. In other words, there must also be some kind of detrimental effect on the resource itself.[107] For example, in the case of a shared watercourse there must be a change in chemical composition of the water, a reduction in quantity of water, or some other alteration that impacts upon the ability of the downstream state to utilise the shared watercourse.[108]

The second relevant issue was whether co-riparian states had a general duty to obtain the consent of other states and negotiate an agreement prior to commencing projects that will substantially change a shared waterway.[109] In its Memorial to the Tribunal, Spain referred to various multilateral agreements, the decisions of German, Swiss and the United States federal courts and the written opinions of over thirty publicists in support of this duty.[110] The Tribunal recognised that states have an international obligation 'to seek, by preliminary negotiations,

[102] *Lake Lanoux Arbitration* (1957) 24 ILR 101, 123.
[103] Ibid.
[104] Ibid, 123, 129.
[105] Ibid, 129.
[106] See, eg, Sands and Peel, above n 12, 197; Birnie, Boyle and Redgwell, above n 8, 144; Stephens, above n 58, 171.
[107] Nanda and Pring, above n 57, 83.
[108] Stephens, above n 58, 170.
[109] *Lake Lanoux Arbitration* (1957) 24 ILR 101, 112.
[110] Ibid.

terms for an agreement, without subordinating the exercise of their competences to the conclusion of such an agreement.'[111] That is, they have an obligation to consult with other states and *attempt* to reach an agreement, but are not obliged to *conclude* such an agreement. According to the Tribunal, an obligation to conclude an agreement would unduly restrict the sovereignty of states.[112] This is because a co-riparian state could restrict the sovereign right of the other state to act as it will within its own territory simply by refusing to reach agreement.[113] Therefore:

> [T]he rule that States may utilize the hydraulic power of international watercourses only on condition of a prior agreement between the interested States cannot be established as a custom, even less as a general principle of law.[114]

4.4.3 Significance of the Lake Lanoux arbitration

The *Lake Lanoux* arbitration reinforced the no-harm rule as a tool for balancing and protecting the sovereign interests of states, rather than as a rule for protecting the environment *per se.* According to Stephens, the Tribunal only considered the impact of the French proposal on the utilisation of the River Carol for human purposes, and ignored potential ecological impacts.[115] He notes that the decision focused on 'ensuring the return of an equivalent amount of water to the watercourse, not how that return was effected and certainly not whether an upstream project would result in the permanent alteration of the watercourse environment.'[116] Lammers further notes that the Tribunal did not give any detailed consideration to France's obligations under customary international law concerning water pollution.[117] The narrow focus of the Tribunal on human, rather than environmental interests is also demonstrated by its decision as to what constituted 'alteration' of a shared watercourse. The decision suggests that, in order for an activity to be considered to alter a shared watercourse, it must involve harm to the *human* interests of a downstream state.[118] Therefore, even though the *Lake Lanoux* arbitration concerned a common environmental resource, the scope of the no-harm rule remained bound to the rights and interests of states.

Similarly to the *Corfu Channel* case, the *Lake Lanoux* arbitration also suggested that procedural obligations might flow from the no-harm rule. The Tribunal confirmed that upstream states

[111] Ibid, 128.
[112] *Lake Lanoux Arbitration* (1957) 24 ILR 101, 128.
[113] Ibid, 128-130.
[114] Ibid, 130.
[115] Stephens, above n 58, 169.
[116] Ibid.
[117] Lammers, above n 8, 511.
[118] See also, Stephens, above n 168-169.

have a duty to notify and consult with downstream states with regards to proposed activities that are likely to cause significant transboundary harm.[119] This must be done in good faith.[120] The Tribunal did not consider the duty to consult and notify beyond the context of shared watercourses. It is arguable that, at the time of the *Lake Lanoux* arbitration, this procedural obligation only applied in this context, as there was insufficient state practice to support a broader application.[121] Nevertheless, the Tribunal's consideration of the rights of states in this regard is general and readily translates to other circumstances of transboundary harm. The *Lake Lanoux* arbitration therefore supports the existence of a general procedural obligation to consult and notify other states with regards to activities that pose a risk of transboundary harm.[122]

4.5 CONCLUSION

This chapter has examined the first phase in the development of the no-harm rule. The cases examined here indicate that during this phase the scope of the no-harm rule was limited to 'serious' harm caused to the territory or interests of other states. Furthermore, the scope was also limited to harm to human interests, and did not respond to environmental harm *per se*. The no-harm rule was characterised as a tool for balancing and protecting the sovereign rights of states rather than as a tool for environmental protection.[123]

The standard of care for states to satisfy their obligations under the no-harm rule is less clear during this phase. It is possible for the decisions of the *Trail Smelter* arbitration, *Corfu Channel* case and the *Lake Lanoux* arbitration to be interpreted to support either a standard of strict liability (duty of result) or fault-based liability (duty of conduct).[124] As demonstrated above, certain aspects of these judgments reflect the content of the duty of conduct or 'due diligence' obligation as found in more recent interpretations of the no-harm rule.[125] For example, the decisions in the *Corfu Channel* case and *Lake Lanoux* arbitration suggest that states may have a duty to notify other states of harm that might result from their actions. However, the lack of

[119] See Mari Koyano, 'The Significance of Procedural Obligations in International Environmental Law: Sovereignty and International Co-operation ' (2011) 54 *Japanese Yearbook of International Law* 97, 102. See also Nanda and Pring, above n 57, 83.
[120] Lammers, above n 8, 517.
[121] See, e.g. Koyano, above n 119, 108-109. Koyano further suggest that even today there may be insufficient state practice to support this procedural obligation as a rule of customary international law.
[122] See Birnie, Boyle and Redgwell, above n 8, 177-178.
[123] See Kerryn Brent, Jeffrey McGee and Amy Maguire, 'Does the 'No-Harm' Rule Have a Role in Preventing Transboundary Harm and Harm to the Global Atmospheric Commons from Geoengineering?' (2015) 5(1) *Climate law* 35, 41.
[124] Sands and Peel, above n 12, 712.
[125] This is discussed further in chapter 6 and chapter 7.

consideration of fault in these cases weighs in favour of a duty of result during the first phase of the no-harm rule's development. This standard of care and the scope of the no-harm rule began to change throughout the second phase of the no-harm rule's development.

5 Phase Two of the Development of the No-Harm Rule 1972-2001: Prevention of Harm and Extending the No-Harm Rule to the Global Commons

5.1 INTRODUCTION

The previous chapter examined the development of the no-harm rule during the first half of the twentieth century. During this first phase, the no-harm rule was predominantly directed at balancing and protecting the rights of states. Its scope was confined to transboundary harm between states. Sources during this phase also suggest that the no-harm rule only applied to harm to human interests. That is, it did not respond to environmental harm *per se*. It also did not extend to harm caused beyond the sovereign jurisdiction of states to global commons areas, such as the high seas or the atmosphere.[1] However, this interpretation of the no-harm rule began to change during the second phase of its development.

In the 1960's and 1970's, the international community became increasingly concerned about the widespread, global consequences that human activities were having on the natural environment.[2] During this period, a body of rules began to emerge addressing international environmental issues.[3] Notable examples are the 1959 *Antarctic Treaty*[4], the 1963 *Treaty Banning Nuclear Weapons Tests in the Atmosphere, in Outer Space and Under Water* (*'Partial Test Ban Treaty'*)[5], and the 1971 *Convention on Wetlands of International Importance* (*'Ramsar Convention'*)[6]. However, the scope of treaty-making was far from comprehensive. As noted by Sands and Peel, until this point international efforts at environmental governance

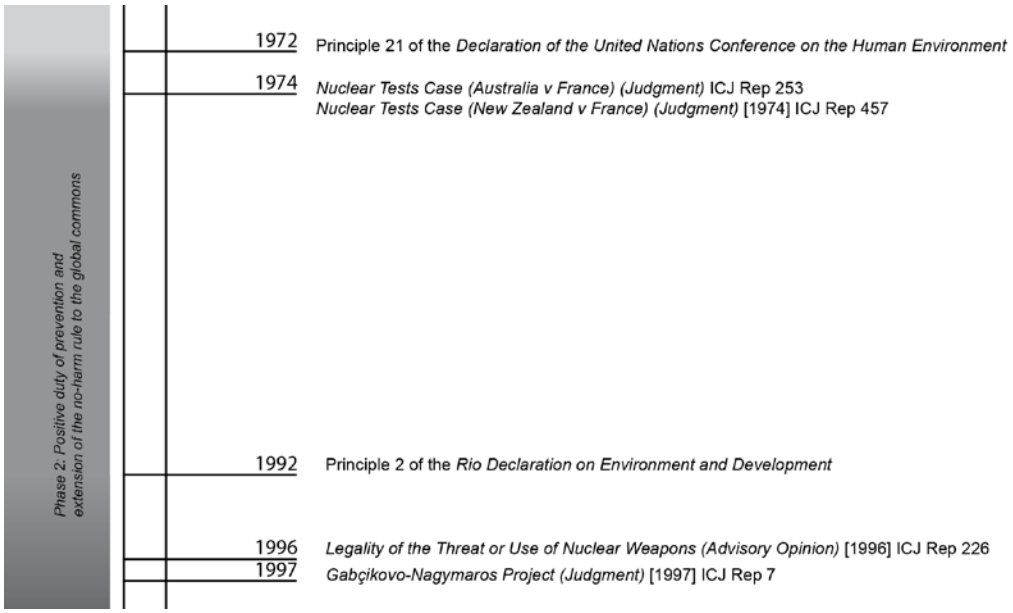
[1] The legal status of the atmosphere is discussed in further detail in chapter 7. The atmosphere may overlap with the territorial airspace of states. However, as a fluid body of gases it cannot be physically delineated or controlled. It is beyond the exclusive jurisdiction of any one state and therefore can be considered to be a global commons. See Marvin S Soroos, 'Preserving the Atmosphere as a Global Commons' (1998) 40(2) *Environment: Science and Policy for Sustainable Development* 6, 7.
[2] This concern is illustrated in publications such as Rachel Carson, *Silent Spring* (Hamish Hamilton, 1963) and Garrett Hardin, 'The Tragedy of the Commons' (1968) 162(3859) *Science* 1243. See also Ved P Nanda and George (Rock) Pring, *International Environmental Law and Policy for the 21st Century* (Martinus Nijhoff Publishers 2ed, 2013) 97.
[3] Philippe Sands and Jacqueline Peel, *Principles of International Environmental Law* (Cambridge University Press, 3rd ed, 2012), 29.
[4] *The Antarctic Treaty*, opened for signature 1 December 1959, 402 UNTS 72 (entered into force 23 June 1961).
[5] *Treaty Banning Nuclear Weapons Tests in the Atmosphere, in Outer Space and Under Water*, opened for signature 5 August 1953, 480 UNTS 45 (entered into force 10 October 1963).
[6] *Convention on Wetlands of International Importance*, opened for signature 2 February 1971, 996 UNTS 246 (entered into force 21 December 1975).

had developed in a 'piecemeal fashion, and the lack of co-ordination hampered efforts to develop a coherent international environmental strategy.'[7]

The *1972 Declaration of the United Nations Conference on the Human Environment* ('*Stockholm Declaration*') marked a turning point in international law and policy. This was the first time states had come together to discuss a global strategy for responding to international environmental issues.[8] The *Stockholm Declaration* also marked a turning point in the development of the no-harm rule. Following this declaration, there was a shift in focus away from mere reparation for transboundary harm towards a positive duty of prevention. Understanding of the scope of the no-harm rule was also extended to include harm to the global commons.

This chapter examines the second phase in the development of the no-harm rule 1972-1997, set out in the timeline below:

Figure 5.1 Timeline of the second phase of the development of the no-harm rule



[7] Sands and Peel, above n 3, 29. See also Nanda and Pring, above n 2, 98.

[8] See, eg, Jutta Brunnée, 'The Stockholm Declaration And The Structure And Processes Of International Environmental Law' in Aldo Chircop, Ted McDorman and Susan Rolston (eds), *The Future of Ocean Regime-Building* (Brill Nijhoff, 2009) 41, 49. Ulrich Beyerlin and Thilo Marauhn, *International Environmental Law* (Hart, 2011) 7. Beyerlin and Marauhn state that the Stockholm Conference was convened to provide a centralised and coordinated response to international environmental problems.

Section 5.2 analyses the 1972 *Stockholm Declaration* and principle 21. Section 5.3 considers the contribution of the 1974 *Nuclear Tests* cases to this new phase in the development of the no-harm rule. Section 5.4 examines principle 2 of the *Rio Declaration,* and how other principles contained in the *Rio Declaration* emphasised the duty to prevent transboundary harm and harm to the global commons. Section 5.5 analyses how the ICJ's *Advisory Opinion on the Legality of the Threat or Use of Nuclear Weapons* ('*Nuclear Weapons* advisory opinion') confirmed the extended version of the no-harm rule for the global commons to be a rule of customary international law. Finally, section 5.6 explores the decision of the ICJ in the *Gabčíkovo-Nagymaros Project*, and considers how the submissions made by Hungary in that case foreshadowed the third phase in the development of the no-harm rule.

5.2 1972: PRINCIPLE 21 OF THE DECLARATION OF THE UNITED NATIONS CONFERENCE ON THE HUMAN ENVIRONMENT

The United Nations Conference on the Human Environment was held in Stockholm in June 1972. It was the first international conference to address global environmental concerns alongside issues of human welfare and development. The key outcome of the conference was the *Declaration of the United Nations Conference on the Human Environment* ('*Stockholm Declaration*').[9] The *Stockholm Declaration* consists of 26 principles to 'inspire and guide the peoples of the world in the preservation and enhancement of the human environment'.[10] Although the *Stockholm Declaration* in itself is non-binding,[11] the no-harm rule is reformulated in principle 21.

5.2.1 Background to the UN Conference on Human Development and the Stockholm Declaration

The UN Conference on Human Development was originally proposed by Sweden in 1968.[12] In a letter to the United Nations Social and Economic Council, Sweden urged the United Nations General Assembly (UNGA) to convene a conference to address the impact of industry

[9] *Declaration of the United Nations Conference on the Human Environment*, UN Doc.A/CONF/48/14/REV.1 (16 June 1972) ('*Stockholm Declaration*').
[10] *Stockholm Declaration*, preamble.
[11] Beyerlin and Marauhn, above n 8, 7;
[12] *Consideration of the Provisional Agenda for the Forty-Fifth Session, Addendum, The question of convening an international conference on the problems of human environment: Letter dated 20th May 1968 from the Permanent Representative of Sweden addressed to the Secretary-General of the United Nations*, UN SCOR, 44th sess, Agenda Item 23, UN Doc E/4466/Add.1 (22 May 1968). For a comprehensive overview of development of the *Stockholm Declaration* see Louis B Sohn, 'The Stockholm Declaration on the Human Environment' (1973) 14(3) *Harvard International Law Journal* 423.

and technology on the natural environment, and associated impacts on human wellbeing.[13] The primary goal of the conference was to 'encourage, and to provide guidelines for, action by Governments and international organizations designed to protect and improve the human environment and to remedy and prevent its impairment, by means of international cooperation'.[14] A Preparatory Committee was established to assist the Secretary-General in organising and preparing the conference.[15] This preparation included the drafting of a declaration to be adopted at the conference.

The Preparatory Committee intended the declaration to contain a set of universally recognisable principles as well as broad goals and objectives for the protection of the environment.[16] The members of the Preparatory Committee widely agreed that the contents of the declaration should be 'inspirational and concise' and should primarily serve as 'an effective instrument for education and stimulate public awareness and community participation in action for the protection of the environment.'[17] Moreover, it was also decided that the declaration itself 'should not formulate legally binding provisions'.[18] From early on, the goal of states in drafting the *Stockholm Declaration* was merely to create a set of soft-law principles to guide the development of global environmental policy.

Following further debate during the conference, the final text of the *Stockholm Declaration* was adopted by acclamation.[19] However, state support for the outcomes of the conference, including the *Stockholm Declaration*, was not unanimous. The German Democratic Republic had not been allowed to attend the conference. In response, socialist countries of Eastern

[13] Ibid. The UNGA adopted the decision to convene the conference in *Problems of the human environment*, GA Res 2398,UN GAOR 23rd sess, 1733th mtg, (3 December 1968).
[14] *United Nations Conference on the Human Environment*, GA Res 2581, UN GAOR, 24th sess, 1834 mtg, (15 December 1969).
[15] 'Constitution of the Conference' in *Report of the United Nations Conference on the Human Environment*, 5-16 June 1972, United Nations Publication, A/CONF.48/14/Rev., 37. The preparatory committee consisted of 'highly qualified representatives nominated by the Governments of Argentina, Brazil, Canada, Costa Rica, Cyprus, Czechoslovakia, France, Ghana, Guinea, India, Iran, Italy, Jamaica, Japan, Mauritius, Mexico, the Netherlands, Nigeria, Singapore, Sweden, Togo, the Union of Soviet Socialist Republics, the United Arab Republic, the United Kingdom of Great Britain and Northern Ireland, the United States of America, Yugoslavia and Zambia'. See also, Sohn, above n 12, 425.
[16] *Report of the Preparatory Committee for the United Nations Conference on the Human Environment*, Preparatory Committee for the United Nations Conference on the Human Environment, 2nd sess, A/Conf.48/PO49 (26 February 1971) [30]-[32].
[17] Ibid, [29]. See also, Sohn, above n 12, 426.
[18] Ibid, [33]. See also, Sohn, above n 12, 427.
[19] *Report of the United Nations Conference on the Human Environment*, 5-16 June 1972, United Nations Publication, A/CONF.48/14/Rev., 66. For a detailed overview of the debate during the conference, see Sohn, above n 12, 430-431.

Europe (including the USSR) and Cuba boycotted the conference.[20] Following the conference in the UNGA Second Committee, these countries declared that they did not consider themselves bound by the conference outcomes and that they did not support all the principles of the *Stockholm Declaration*.[21] China also expressed that it still had 'reservations with regard to some of the principles it embodies.'[22] Trinidad and Tobago criticised the outcomes of the conference, including the *Stockholm Declaration*, as inadequate to address the needs of developing countries and operating to their detriment.[23] Chile voiced similar concerns, suggesting that the conference had focused too heavily on 'problems affecting the industrialized capitalist countries' and not enough on those affecting developing countries.[24] While South Africa agreed in principle with the content of the *Stockholm Declaration*, it could not accept its content *in toto* because of its reference in principle 1 to its internal policy of apartheid.[25] Nonetheless, on 15 December 1972 the UNGA passed resolution 2994, drawing the attention of governments to the Declaration and '[e]xpressing its satisfaction that the Conference and the Preparatory Committee for the United Nations Conference on the Human Environment succeeded in focusing the attention of Governments and public opinion on the need for prompt action in the field of the environment.'[26]

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[20] Allen L Springer, *Cases of Conflict: Transboundary Disputes and the Development of International Environmental Law* (University of Toronto Press, 2016), 30.

[21] See *United Nations Conference on the Human Environment: Report of the Secretary General (continued)*, UN GAOR, 2nd Comm, 27th Sess, 1469th mtg, Agenda Item 47, UN Doc A/C.2/SR.1469 (24 October 1972) [11]-[12], [40]-[42]; *United Nations Conference on the Human Environment: Report of the Secretary General (continued)*, UN GAOR, 2nd Comm, 27th Sess, 1470th mtg, Agenda Item 47, UN Doc A/C.2/SR.1470 (24 October 1972) [30]-[42]; *United Nations Conference on the Human Environment: Report of the Secretary General (continued)*, UN GAOR, 2nd Comm, 27th Sess, 1472nd mtg, Agenda Item 47, UN Doc A/C.2/SR.1472 (25 October 1972) [1]-[4], [30]-[36]; *United Nations Conference on the Human Environment: Report of the Secretary General (continued)*, UN GAOR, 2nd Comm, 27th Sess, 1473rd mtg, Agenda Item 47, UN Doc A/C.2/SR.1473 (26 October 1972) [4]-[29].

[22] *United Nations Conference on the Human Environment: Report of the Secretary General (continued)*, UN GAOR, 2nd Comm, 27th Sess, 1472nd mtg, Agenda Item 47, UN Doc A/C.2/SR.1472 (25 October 1972) Summary records of the Second Committee of the General Assembly 1472nd Meeting, Agenda item 47 A/C.2/SR.1472 (25 October 1972) [44]. See also, Sohn, above n 12, 432.

[23] Ibid, [53].

[24] *United Nations Conference on the Human Environment: Report of the Secretary General (continued)*, UN GAOR, 2nd Comm, 27th Sess, 1468th mtg, Agenda Item 47, UN Doc A/C.2/SR.1468 (20 October 1972) [39].

[25] *United Nations Conference on the Human Environment: Report of the Secretary General (continued)*, UN GAOR, 2nd Comm, 27th Sess, 1479th mtg, Agenda Item 47, UN Doc A/C.2/SR.1479 (2 November 1972) [17]. See also, Sohn, above n 12, 433.

[26] United Nations Conference on the Human Environment, GA Res 2994, UN GAOR, 27th sess, Agenda Item 47, UN Doc A/RES/27/2994 (15 December 1972). The resolution was adopted with 112 votes for and 10 abstentions. The position of member states is not known as the vote was unrecorded. See *Resolutions adopted by the General Assembly at its 27th Session*, Dag Hammarkjöld Library <http://research.un.org/en/docs/ga/quick/regular/27>.

5.2.2 Reformulation of the no-harm rule in principle 21

The no-harm rule is reformulated in principle 21 of the *Stockholm Declaration*, which affirms:

> States have, in accordance with the Charter of the United Nations and the principles of international law, the sovereign right to exploit their own resources pursuant to their own environmental policies, *and the responsibility to ensure that activities within their jurisdiction or control do not cause damage to the environment of other States or of areas beyond the limits of national jurisdiction*. (emphasis added)

Principle 21 balances the no-harm rule against the principle of state sovereignty. In this sense, the rule remains anchored in the concepts of state sovereignty and non-interference from which it developed in its first phase.[27] However, principle 21 extended the no-harm rule to include harm to the global commons in addition to transboundary harm to the territory of other states.[28] Principle 21 also extended the no-harm rule with respect to the 'jurisdiction or control' of states. That is, it not only applies to the activities of states within their own territory, but also to activities carried out on ships or aircraft registered within a state.[29] As such, principle 21 may also apply to the activities of corporations incorporated within a state.[30] Finally, principle 21 reshaped the no-harm rule as a 'positive duty' in that states have a responsibility to actively prevent environmental harm, not merely to make reparations once harm is caused.[31]

While principle 21 developed the no-harm rule in some respects, it also left a number of key issues unanswered. First, principle 21 does not clearly state whether there is a threshold level of harm necessary to trigger application of the no-harm rule.[32] Second, it does not define the standard of care that states must satisfy in order to discharge their obligations under the no-harm rule.[33] Third, it does not clarify what types of harm qualify as environmental damage.[34] Fourth, while it extends the scope of the no-harm rule to the global commons, it does not clarify

[27] See also Brunnée, above n 8, 43.
[28] Patricia Birnie, Alan Boyle and Catherine Redgwell, *International Law and the Environment* (Oxford Univerity Press, 3rd ed, 2009), 145; Sands and Peel, above n 3, 32.
[29] Sands and Peel, above n 3, 32.
[30] Sohn, above n 12, 493; Springer, above n 20, 33.
[31] Birnie, Boyle and Redgwell, above n 28, 147. This comment is made with regards to principle 2 of the *Rio Declaration*. Principle 2 of the Rio Declaration reflects the no-harm rule as formulated in principle 21 of the *Stockholm Declaration*.
[32] See Springer, above n 20, 33. Springer suggests that principle 21 removed the previous threshold of 'serious' harm, as well the high standard of proof required by the formulations in the *Trail Smelter* arbitration.
[33] Sands and Peel, above n 3, 196. But see Alexandre Kiss and Dinah Shelton, 'Strict Liability in International Environmental Law' in *Law of the Sea, Environmental Law and Settlement of Disputes* (2007) 1133. Kiss and Shelton suggest that principle 21 could be interpreted as imposing a duty of absolute responsibility (i.e. duty of result) on states for any transboundary harm, regardless of whether it is fault based or accidental.
[34] Sands and Peel, above n 3, 196. See also Timothy Stephens, *International Courts and Environmental Protection* (Cambridge University Press, 2009) 153. But see Günther Handl, 'Territorial Sovereignty and the Problem of Transnational Pollution ' (1975) 69 *American Journal of International Law* 50, 67. According to Handl, principle 21 only refers to material damage.

how principles of state responsibility might subsequently be invoked if states do not comply with the no-harm rule regarding these areas.[35] According to Brunnée, principle 21 remains 'largely bilateral in its outlook' and was not formulated in such a way as to respond to more complex impacts of the activities of states on the global environment.[36] Finally, as noted by Stephens, principle 21 does not elaborate on any procedural obligations of prevention that might flow from the no-harm rule, such as the duty to notify and consult with other states.[37] Principle 21 has therefore been criticised as providing 'little practical guidance' to states as to the application of the no-harm rule.[38]

Records from the Second Committee of the General Assembly shed further light on the content of principle 21. During the Stockholm Conference, states were unable to reach an agreement on the issue of environmental cooperation between states.[39] Following the conclusion of the conference, thirty seven states introduced Draft Resolution A/C.2/L.1227 designed to resolve this issue.[40] Paragraph 2 called on the UNGA to recognise that:

> [C]o-operation between States in the field of the environment, including co-operation for the implementation of *Principle 21* and 22 of the "Declaration on the Human Environment", will be effectively achieved if official and public knowledge is provided of the technical data relating to the work to be carried out by States within their national jurisdiction with a view to avoiding *significant* harm which may occur in the human environment of the adjacent area.[41] (emphasis added)

The reference to principle 21 in this paragraph sparked fresh consideration of its content.

Several states suggested that the wording of the above paragraph might modify the standard of care required by principle 21.[42] Canada was concerned that the wording implied that states would satisfy their obligations under principle 21 so long as they made publicly available technical data of activities that pose a threat of transboundary harm or harm to the global commons.[43] According to Canada, 'something more than the publication of information' was

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[35] Brunnée, above n 8, 44.
[36] Ibid.
[37] Stephens, above n 34, 153.
[38] Ibid.
[39] See *Summary records of the Second Committee of the General Assembly*, 1467th Meeting, 27th, Agenda item 47 (20 October 1972) 131-132 [10].
[40] *United Nations Conference on the Human Environment: Co-operation between States in the field of the human environment*, UN GAOR, 2nd Comm, 27th sess, Agenda Item 47, A/C.2/L.1227 (16 October 1972).
[41] Ibid, [2].
[42] The UNGA subsequently adopted *International responsibility of States in regard to the environment*, GA Res 2996, UN GAOR, 27th sess, 2112th mtg, UN Doc A/RES/2996 (15 December 1972), which stated that 'no resolution adopted at the twenty seventh session of the General Assembly can affect principles 21 and 22 of the Declaration of the United Nations Conference on the Human Environment.'
[43] *United Nations Conference on the Human Environment: Report of the Secretary General (continued)*, UN GAOR, 2nd Comm, 27th Sess, 1469th mtg, Agenda Item 47, UN Doc A/C.2/SR.1469 (24 October 1972) [38]. Ireland and Finland shared Canada's concern in this regard. See *United Nations Conference on the Human*

clearly required to satisfy this obligation.[44] Similarly, Mexico stated that the obligation under principle 21 could not be 'met by merely informing neighbouring countries' and that the above paragraph 'could lead to the ridiculous situation where the State faced with a serious threat to its environment would only be entitled to be notified that such damage would be caused.'[45] New Zealand agreed that principle 21 would not be satisfied merely by exchanging information, as it clearly called for states to 'to exercises responsibility so as to ensure that they did not cause damage to the environment of other States.'[46] These comments suggest that, at the time of the *Stockholm Declaration*, some states were of the opinion that states could not discharge their obligations under the no-harm rule merely by fulfilling a procedural obligation to notify. In other words, the standard of care was higher. However, it is unclear whether this higher standard of care remained a duty of conduct, in the sense that states had to take further, positive action to prevent their activities from causing transboundary harm or harm to the global commons, or whether the relevant standard of care was one of strict responsibility (i.e. a duty of result).

Draft Resolution A/C.2/L.1227 also went further than the text of principle 21 in that it indicated a threshold level of 'significant' harm. New Zealand made further comments regarding this threshold. It stated that use of the term 'significant harm' might weaken the scope of principle 21, leaving it open to interpretation as to what activities triggered the application of the rule.[47] This statement suggests that at least one state was of the view that principle 21 applied to all sources of transboundary environment harm and harm to the environment of the global commons, regardless of the level of severity.

Environment: Report of the Secretary General (continued), UN GAOR, 2nd Comm, 27th Sess, 1471st mtg, Agenda Item 47, UN Doc A/C.2/SR.1461 (25 October 1972) [56]; *United Nations Conference on the Human Environment: Report of the Secretary General (continued)*, UN GAOR, 2nd Comm, 27th Sess, 1472nd mtg, Agenda Item 47, UN Doc A/C.2/SR.1472 (25 October 1972) [12].

[44] *United Nations Conference on the Human Environment: Report of the Secretary General (continued)*, UN GAOR, 2nd Comm, 27th Sess, 1469th mtg, Agenda Item 47, UN Doc A/C.2/SR.1469 (24 October 1972) [38].

[45] *United Nations Conference on the Human Environment: Report of the Secretary General (continued)*, UN GAOR, 2nd Comm, 27th Sess, 1470th mtg, Agenda Item 47, UN Doc A/C.2/SR.1470 (24 October 1972) [48]. Summary records of the Second Committee of the General Assembly 1470th Meeting, Agenda item 47, (24 October 1972) 158.

[46] *United Nations Conference on the Human Environment: Report of the Secretary General (continued)*, UN GAOR, 2nd Comm, 27th Sess, 1472nd mtg, Agenda Item 47, UN Doc A/C.2/SR.1472 (25 October 1972), [43].

[47] Ibid.

Support for the balance of sovereign rights implicit in the no-harm rule and principle 21 does not appear to have been universal. The USSR[48], China[49] and Cuba[50] made statements that suggest they did not recognise the balance between state interests implicit in the construction of principle 21. That is, they considered the right of states to exploit their own resources and to follow their own developmental policies to take precedence over the prevention of transboundary harm. However, these statements were in the minority and must be contrasted with widespread support for principle 21. For example, Canada stated that 'Principle 21 in fact accorded with existing international law as did the principle of the duty to inform one another of the environmental effects of their activities.'[51] The United States interpreted principle 21 in light of existing rules of state responsibility, claiming that:

> [N]othing contained in this principle [21] or elsewhere in the Declaration, diminishes in any way the obligation of States to prevent environmental damage or gives rise to any right on the part of States to take actions in derogation of the rights of other States or of the community of nations. The statement on the responsibility of States for damage caused to the environment of other States or of areas beyond the limits of national jurisdiction is not in any way a limitation on the above obligation, but an affirmation of existing rules concerning liability in the event of default on the obligation.'[52]

Principle 21 has had a profound impact on the development of international environmental law. In the decades since the Stockholm Conference, principle 21 has been acknowledged and reiterated in numerous multilateral agreements.[53] It is repeated almost verbatim in the 1992 *Rio*

[48] *United Nations Conference on the Human Environment: Report of the Secretary General (continued)*, UN GAOR, 2nd Comm, 27th Sess, 1470th mtg, Agenda Item 47, UN Doc A/C.2/SR.1470 (24 October 1972) [34]: 'The Soviet Union was opposed to any attempt to limit State sovereignty over natural jurisdiction and control, which had been won after a prolonged struggle against colonialism and neo-colonialism.'

[49] *United Nations Conference on the Human Environment: Report of the Secretary General (continued)*, UN GAOR, 2nd Comm, 27th Sess, 1472nd mtg, Agenda Item 47, UN Doc A/C.2/SR.1472 (25 October 1972) [52]. China stated that 'All international agreements and actions relating to environmental preservation must strictly respect the Sovereign rights of States.'

[50] *United Nations Conference on the Human Environment: Report of the Secretary General (continued)*, UN GAOR, 2nd Comm, 27th Sess, 1473rd mtg, Agenda Item 47, UN Doc A/C.2/SR.1473 (26 October 1972) [9]. Cuba stated that '… while all States had a duty to avoid causing damage to third countries when executing their development plans, exploiting their resources or applying their environmental policies, they also had the right to ensure their own development, establish their priorities and formulate their environmental protection policies on the basis of their own conditions, values and particular features, without foreign intervention of any sort.'

[51] *Report of the United Nations Conference on the Human Environment*, 5-16 June 1972, United Nations Publication, A/CONF.48/14/Rev, 64.

[52] Ibid, 66.

[53] See, eg, *Convention on Biological Diversity*, opened for signature 5 June 1992, 1760 UNTS 79 (entered into force 29 December 1993) ('*CBD*') art 3; *United Nations Framework Convention on Climate Change*, opened for signature 9 May 1992, 1771 UNTS 107 (Entered into force 21 March 1994) ('*UNFCCC*') preamble; *Convention on Long-range Transboundary Air Pollution*, opened for signature 13 November 1979, 1302 UNTA 217 (entered into force 16 March 1983) ('*LRTAP*') preamble; *Vienna Convention for the Protection of the Ozone Layer*, opened for signature 22 March 1985, 1513 UNTS 293 (entered into force 22 September 1988) ('*Ozone Convention*') preamble.

Declaration.[54] Finally, as discussed further below, the extended version of the no-harm rule for the global commons has since been confirmed as customary international law by the ICJ. Principle 21 is now synonymous with the no-harm rule. However, as seen below in the Nuclear Tests case, this impact was not instantaneous.

5.3 1974: NUCLEAR TESTS CASES (NEW ZEALAND V FRANCE; AUSTRALIA V FRANCE)

Shortly after the Stockholm Conference in 1973, Australia and New Zealand initiated separate proceedings against France in the ICJ concerning France's nuclear test program in the Pacific. Transboundary nuclear fallout, and contamination of the atmosphere and oceans from radioactive fallout was a central issue. In their submissions to the ICJ, Australia and New Zealand framed their arguments predominantly around the principle of state sovereignty, rather than the no-harm rule as formulated in the *Stockholm Declaration* principle 21. Furthermore, the ICJ did not render a judgment on the merits of these cases, because in 1974, France made a unilateral declaration, terminating its atmospheric nuclear testing program. This declaration was held to be legally binding by the ICJ, and, as such, the majority no longer saw a need to rule on the merits of the case.[55] The majority of the Court determined the object of Australia and New Zealand's cases as being to prevent any future atmospheric nuclear testing by France in the Pacific.[56] But legal scholars have nevertheless recognised these disputes as important to the development of international environmental law and the no-harm rule.[57] Correspondence between the Parties and their submission to the ICJ shed further light on how states viewed their international obligations regarding transboundary pollution and the prevention of harm to the global commons.

[54] *Declaration of the United Nations Conference on Environment and Development*, UN Doc.A/CONF.151/26/Rev.1 (3-14 June 1992) ('*Rio Declaration*').
[55] *Nuclear Tests Case (Australia v France) (Judgment)* [1974] ICJ Reports 253, [51]-[52], [59]; *Nuclear Tests Case (New Zealand v France) (Judgment)* [1974] ICJ Reports 457, [52]-[62].
[56] *Nuclear Tests Case (Australia v France) (Judgment)* [1974] ICJ Reports 253, [27]; *Nuclear Tests Case (New Zealand v France) (Judgment)* [1974] ICJ Reports 457, [45]
[57] Legal scholars have placed particular emphasis on the contribution of the interim orders awarded by the Court. See, eg, L F E Goldie, 'The Nuclear Tests Cases: Restraints on Environmental Harm ' (1974) 5(3) *Journal of Maritime Law and Commerce* 491; Stephens, above n 34, 137. They have also emphasised the contribution of dissenting opinions. See, eg, Sands and Peel, above n 3, 196; Birnie, Boyle and Redgwell, above n 28, 201; Stephens, above n 34, 137.

5.3.1 Background to the dispute

Following the end of the Second World War, a number of states engaged in the atmospheric testing of nuclear weapons, included the Soviet Union and the United States.[58] At the time, atmospheric testing was believed to have minimal impacts on the rights of other states and was regarded as necessary and reasonable in the early stages of the Cold War.[59] By the 1960s, the attitude of the international community towards atmospheric nuclear testing had changed. Scientific understanding of the impacts of nuclear radiation had advanced and there was growing concern within the international community of the long-term impacts of nuclear radiation on human health and the health of the global environment.[60] In 1963, the Soviet Union, United States and United Kingdom concluded the *Treaty banning nuclear weapon tests in the atmosphere, in outer space and under water* (*Partial Test Ban Treaty*).[61] The treaty prohibited atmospheric nuclear testing in order to 'put an end to the contamination of man's environment by radioactive substances'.[62] The treaty was readily supported by other states, including Australia and New Zealand.[63] France did not sign the *Partial Test Ban Treaty*. In 1963, the same year that the *Partial Test Ban Treaty* was concluded, the French Government announced that it would commence a program of atmospheric nuclear testing from its overseas territory in French Polynesia.[64] Despite the growing international opposition to atmospheric nuclear testing, from 1966 to 1972 the French government conducted 29 atmospheric nuclear tests from Mururoa Atoll in French Polynesia.[65]

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[58] An infamous example is the atmospheric nuclear test from 1946-1958 conducted by United States government from Bikini Atoll in the Marshall Islands. See 'Bikini Atoll nuclear test: 60 years later and islands still unliveable', The Guardian, 2 March 2014 <https://www.theguardian.com/world/2014/mar/02/bikini-atoll-nuclear-test-60-years>.

[59] Anthony D'Amato, 'Legal Aspects of the French Nuclear Tests' (1967) 61 *American Journal of International Law* 66, 68.

[60] See Stephens, above n 34, 138-139.

[61] *Treaty banning nuclear weapon tests in the atmosphere, in outer space and under water*, opened for signature 5 August 1963, 480 UNTS 45 (entered into force 10 October 1963).

[62] Ibid, art 1.

[63] Australia signed on the 8 August 1963 and ratified on the 12 November 1963; New Zealand signed on the 8 August 1963 and ratified on the 10 and 16 October 1963. A full list of initial signatories follows the text of the agreement.

[64] See Goldie, above n 57, 498. France had initially conducted atmospheric and underground nuclear testing in Algeria, but this program ceased following *UN General Assembly Resolution Question of French nuclear tests in the Sahara*, GA Res 1379, UN GAOR, 14th sess, 840th mtg, UN Doc A/RES/1379 (20 November 1959) (at 497). For a brief history on French colonisation in the Pacific and sovereignty over these islands, see D'Amato, above n 59.

[65] 'Application Instituting Proceedings Submitted by the Government of New Zealand' *Nuclear Tests Case (New Zealand v France)* [1973] ICJ Pleadings 2, Annex II; Application Instituting Proceedings, *Nuclear Tests Case (Australia v France)* [1973] ICJ Pleadings 1, 6.

Australia and New Zealand objected to France's program because of the location of the test site in the Pacific region.[66] In diplomatic correspondence prior to commencing judicial action, they raised numerous objections, ranging from public health concerns to the violation of state sovereignty. For example, a note from the New Zealand Embassy to the French Ministry of Foreign affairs acknowledged that there was 'widespread public apprehension that fallout from any tests in the vicinity will produce hazards to health and contaminate food supplies, both land and marine, in the Cook Islands and indeed in New Zealand itself.'[67] On the 3rd January 1973, the Australian Ambassador to Paris in a note to the French Foreign Minister stated:

> In the opinion of the Australian Government, the conducting of such tests would not only be undesirable but would be unlawful- particularly in so far as it involves modification of the physical conditions of and over Australian territory; pollution of the atmosphere and of the resources of the seas; interference with freedom of navigation both on the high seas and in the airspace above; and infraction of legal norms concerning atmospheric testing of nuclear weapons.[68]

France denied that its conduct breached existing rules of international law. In correspondence to the Australian Prime Minister, France stated that as no harm had yet occurred to the territory or citizens of Australia, it 'finds it hard to see what is the precise rule on whose existence Australia relies.'[69] France further argued that it had a right to conduct the tests on grounds of self-defence. In a letter to the Australian Prime Minister and Minister of Foreign Affairs, France highlighted that it had been invaded three times within the past century and that universal nuclear disarmament had not yet been achieved.[70] Given the ongoing security threat posed by nuclear weapons, France stated that it 'must imperatively endow itself with the means of ensuring its security and preserving its vital interests.'[71] France also claimed that it had implemented sufficient precautionary measures to ensure the safety of neighbouring states and other states in the region.[72] Such measures included the remote location of the test site and the

[66] D'Amato, above n 59, 66-67. According to D'Amato, Chile and Peru also lodged diplomatic protests over the tests, and the United States refused on a number of occasions to transport French personnel to the Pacific Islands on the basis of the *Partial Test Ban Treaty*. He also notes that the local Polynesian community unanimously opposed the tests, fearing the effects of radioactive pollution.
[67] 'Note from New Zealand Embassy to French Ministry of Foreign Affairs', 14 March 1963 in 'Application Instituting Proceedings Submitted by the Government of New Zealand' *Nuclear Tests Case (New Zealand v France)* [1973] ICJ Pleadings 2, 13-14.
[68] 'Note of 3 January 1973 of the Australian Ambassador, Paris, to the French Foreign Minister' in Application Instituting Proceedings, *Nuclear Tests Case (Australia v France)* [1973] ICJ Pleadings 1, 50.
[69] 'Note De L'Ambassadeur De France à Canberra, en date du 7 Février 1973, au Premier Ministre et Ministre des Affaires Éstrangères de L'Australie [Traduction]' in *Nuclear Tests Case (Australia v France)* [1973] ICJ Pleadings 1, 57.
[70] Ibid, 53.
[71] Ibid.
[72] Ibid, 55.

monitoring of global levels of radioactive contamination.[73] However, New Zealand did not consider these measures to have sufficiently negated the risk of harm from nuclear radiation to their territory, the atmosphere and the ocean. As noted by New Zealand: 'an activity that is inherently harmful is not made acceptable even by the most stringent precautionary measures.'[74]

As the disputes could not be resolved through diplomatic means, Australia and New Zealand initiated proceedings before the ICJ. France did not accept the ICJ's jurisdiction over the disputes, as it believed the ICJ to be 'manifestly not competent' to decide the cases.[75] As such, France did not make any written or oral submissions in either dispute. In considering the question of jurisdiction and admissibility, the Court had to consider whether Australia and New Zealand were requesting a judgment as to the status of the legal relationship they shared with France, or whether they were asking for 'a judgment requiring one of the Parties to take, or refrain from taking, some action.'[76] The Court therefore had to consider the nature and content of the claims in both disputes.

5.3.2 The no-harm rule and the Nuclear Tests cases

The primary focus of the *Nuclear Tests* cases was ongoing violation of state sovereignty.[77] In their submissions to the Court, Australia and New Zealand did not seek to claim damages in relation to material harm caused by tests that had already been conducted.[78] Australia and New Zealand instead argued that any future atmospheric nuclear testing by France would continue to violate their sovereign rights as states regardless of whether material harm could be demonstrated.[79] Australia claimed that the tests breached its right to 'be free from atmospheric nuclear weapon tests' and that the deposition of radioactive fallout in its territory was a violation of state sovereignty.[80] New Zealand also argued that the tests would violate its right to be free from radioactive material entering its territory, including its airspace and territorial

[73] Ibid.
[74] Letter from New Zealand Prime Minister to French Foreign Minister, 9 March 1973' in 'Application Instituting Proceedings Submitted by the Government of New Zealand' *Nuclear Tests Case (New Zealand v France)* [1973] ICJ Pleadings 2, 37.
[75] *Nuclear Tests Case (Australia v France) (Judgment)* [1974] ICJ Reports 253, [13].
[76] See Ibid, [22]-[24].
[77] See Handl, above n 34, 50-52.
[78] Ibid.
[79] For further examination of this issue, see ibid.
[80] 'Application Instituting Proceedings', *Nuclear Tests Case (Australia v France)* [1973] ICJ Pleadings 1, 26-28.

waters.[81] Interestingly, neither state chose to allege breach of the no-harm rule in their submissions to the Court.

The focus on territorial sovereignty by both states did not however mean that their submissions were void of environmental concerns. For example, in its application, Australia further noted that:

> Radio-active products released over the oceans inevitably settle on the surface of the sea, whatever precautions are taken, are absorbed into the water and eventually into the life-chains which comprise the marine ecosystems. Species of such living natural resources, being contaminated with radio-active material, might, dependent on their migratory habits, contaminate the diet of ether species, including man, in widely distributed zones.[82]

New Zealand's claim went further, to suggest that states may owe an obligation *erga omnes* to all members of the international community to protect the environment of the global commons from radioactive contamination.[83] New Zealand claimed that continued atmospheric testing would violate its right and the rights of *all* members of the international community 'that no nuclear tests that give rise to radioactive fallout be conducted' and 'to the preservation from unjustified artificial radioactive contamination of the terrestrial, maritime and aerial environment'.[84] New Zealand therefore suggested that these were obligations *erga omnes* that France owed to all members of the international community.[85] Although New Zealand did not explicitly refer to the no-harm rule as articulated in the *Trail Smelter* arbitration or as reformulated in the *Stockholm Declaration,* its argument was nevertheless in keeping with the no-harm rule as extended to the global commons by principle 21.

Explanations have been advanced as to why neither state was willing to stake its claim directly on principle 21 of the *Stockholm Declaration.* One explanation is that this was a strategic decision. Handl notes that, by basing its claim on a breach of territorial sovereignty, Australia argued that proof of harm from radioactive fallout was not required to establish a breach.[86] Similarly, Stephens suggests that this may have been a tactic to avoid the challenge of having to establish causation of harm.[87] The other explanation is that at the time of the case, the legal status of principle 21 may have been unclear. That is, the duty to *prevent* transboundary harm

[81] 'Application Instituting Proceedings Submitted by the Government of New Zealand', *Nuclear Tests Case (New Zealand v France)* [1973] ICJ Pleadings 2, 8.
[82] Application Instituting Proceedings, *Nuclear Tests Case (Australia v France)* [1973] ICJ Pleadings 1, [39].
[83] See also Birnie, Boyle and Redgwell, above n 28, 131.
[84] 'Application Instituting Proceedings Submitted by the Government of New Zealand' *Nuclear Tests Case (New Zealand v France)* [1973] ICJ Pleadings 2, 8. See also, Stephens, above n 141.
[85] Birnie, Boyle and Redgwell, above n 28, 131.
[86] Handl, above n 34, 51-52.
[87] Stephens, above n 34, 140. Stephens describes Australia's claim as equivalent to an international tort of trespass.

and harm to the global commons was not yet firmly established as a principle of customary international law.[88] It was highlighted above that several states did not necessarily agree with the normative contours of principle 21 following the negotiation of the *Stockholm Declaration*. Further, France had declined to accept that its program violated any existing legal norms on the basis that no recognisable damage had been caused to Australia or New Zealand. This view was supported by Judge Ignacio-Pinto in dissent against the interim measure for protection that was granted to both Australia and New Zealand on 22 June 1973. He argued that states only had a duty in international law to compensate for harm once it had been caused.[89] In other words, he did not consider that states had a positive duty to prevent transboundary harm from occurring, even in the context of extremely risky activities, such as nuclear testing.[90]

The *Nuclear Tests* cases did not cease in the 1970's. In 1995, New Zealand sought to reinitiate proceedings against France, following the decision of the French government to conduct a series of underground nuclear tests in the region.[91] However, focusing exclusively on the earlier dispute provides a window for considering how states and the ICJ viewed international law relating to transboundary pollution and harm to the global commons at that time. The *Nuclear Tests* cases suggest that the opinion of states (as well as judges) was mixed concerning the status of the no-harm rule and its application to more complex incidences of transboundary pollution. Further, the correspondence between Australia, New Zealand and France highlights a number of important questions concerning the content of the no-harm rule at this time. First, did the no-harm rule only respond to harm after it had been caused, or did it also respond to the creation of a risk of future harm? Second, what (if any) measures were states required to undertake to minimise the risk of future harm? Third, how did the no-harm rule interact with other rules of international law, such as the right to self-defence? These questions are further addressed in the sources examined below.

[88] See also, ibid, 142.
[89] 'Order of 22 June 1973' *Nuclear Tests Case (Australia v France) (Interim Measures)* [1973] ICJ Reports 99, 130-131 (Judge Ignacio-Pinto).
[90] But see Goldie, above n 57, 495. According to Goldie, interim orders of protection are usually granted to protect the rights of states while a case is heard. The granting of the interim order by the majority of the Court in this case therefore therefor presupposes that there were rights capable of protection.
[91] *Request for an examination of the Situation in Accordance with Paragraph 63 of the Court's Judgment of 20 December 1974 in the Nuclear Tests (New Zealand v France) Case (1995) (Order of 22 September 1995)*[1995] ICJ Rep 288.

5.4 1992: PRINCIPLE 2 OF THE RIO DECLARATION

The *Rio Declaration on Environment and Development* (*Rio Declaration*) was one of three documents concluded at the United Nations Conference on Environment and Development, hosted in Rio in 1992 ('Rio Conference').[92] The goal of the Conference was to develop strategies to promote environmental protection and sustainable development.[93] The original goal of the Rio Conference was to negotiate a legally binding 'Earth Charter'.[94] However, this proposal was rejected by developing states as placing undue emphasis on environmental protection over development.[95] Therefore, like the *Stockholm Declaration*, it was decided before the Rio Conference that the *Rio Declaration* would not be legally binding.

Nevertheless, from the outset, the General Assembly acknowledged the no-harm rule, as formulated by 21 of the *Stockholm Declaration*, as a binding principle of customary international law.[96] Leading up the conference, the General Assembly in Resolution 44/228 reaffirmed that states have a duty to prevent transboundary harm and harm to the global commons under *Stockholm* principle 21.[97] It also affirmed that states are responsible in international law for the 'damage to the environment and natural resources caused by activities within their jurisdiction or control through transboundary interference'.[98] Prior to the Rio conference, states within the Preparatory Committee proposed different formulations of

[92] *Declaration of the United Nations Conference on Environment and Development*, UN Doc.A/CONF.151/26/Rev.1(3-14 June 1992) ('*Rio Declaration*').
[93] See, *United Nations Conference on Environment and Development*, GA Res 228, 2nd Comm, 44th sess, 85th mtg, UN Doc A/RES/44/228 [3].
[94] See Günther Handl, *Declaration of the United Nations Conference on the Human Environment (Stockholm Declaration) 1972 and the Rio Declaration on Environment and Development (1992)*, United Nations Audiovisual Library of International Law < http://legal.un.org/avl/ha/dunche/dunche.html>. See also Springer, above n 20, 37; Jorge E Viñuales, 'The Rio Declaration on Environment and Development' in Jorge E Viñuales (ed) *The Rio Declaration on Environment and Development: A Commentary* (Oxford University Press, 2015) 1, 11.
[95] Handl, '*Declaration of the United Nations'* above n 94. See also Springer, above n 20, 37. According to Springer, the North-South divide was one of a number of political issues that prevented the negotiation of a binding Earth Charter. He notes that at the same time as the Rio conference, leading figures in the US Republican Party had 'begun to question the science behind climate change', which affected the aims of the conference. See also Viñuales, above n 94, 10-12. Viñuales further documents the divergent views of developed and developing countries as to the weighting to be given to environmental versus developmental issues in the *Rio Declaration*.
[96] *United Nations Conference on Environment and Development*, GA Res 228, 2nd Comm, 44th sess, 85th mtg, UN Doc A/RES/44/228.
[97] Ibid.
[98] Ibid.

principle 2.[99] Some of these proposals sought to change the wording and scope of principle 2 from *Stockholm* principle 21.[100] For example, Canada and Austria proposed:

> All individuals, organizations and States shall respect the environment of other individuals, organizations and States, and the Earth's ecosystem; and treat the global commons of the Earth in a manner at least as favourable as their own environment, keeping in mind the interests of human kind as a whole.[101]

According to Duciv-Paoli and Viñuales, Canada and Austria sought to broaden the scope from principle 21 to also provide non-state actors with environmental obligations.[102] They also state that the proposal departed from 'the sovereignty referential' inherent in principle 21 and instead sought to introduce 'non-traditional concepts such as 'eco-systems', global commons', and 'human kind.'[103] The proposals from the Preparatory Committee indicate that some states may have wished to *extend* the scope of the no-harm rule, but they do not suggest that states disagreed with the content of the no-harm rule as it was currently formulated or its status as a principle of customary international law. General Assembly Resolution 44/228 indicates that by the time of the Rio Conference, it was widely accepted by states that they had a positive duty to prevent transboundary harm and harm to the global commons, as well as a duty to make reparations for transboundary harm should it occur.

The no-harm rule as formulated in principle 21 of the *Stockholm Declaration* was restated in principle 2 of the *Rio Declaration*:

> States have, in accordance with the Charter of the United Nations and the principles of international law, the sovereign right to exploit their own resources *pursuant to their own environmental and developmental policies*, and the *responsibility to ensure that activities within their jurisdiction or control do not cause damage to the environment of other States or of areas beyond the limits of national jurisdiction.* (emphasis added)

The wording of principle 2 of the Rio Declaration is the same as principle 21 of the *Stockholm Declaration*, with the exception that it refers to the environmental *and* developmental policies of states. This change reflects the concept of sustainable development which is emphasised throughout the Rio Declaration.[104]

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[99] Leslie-Anne Duvic-Paoli and Jorge E Viñuales, 'Principle 2: Prevention' in Jorge E Viñuales (ed) *The Rio Declaration on Environment and Development: A Commentary* (Oxford University Press, 2015) 107, 110-113.
[100] Ibid.
[101] 'Earth Charter. The Rio de Janeiro Declaration on Environment and Development', UN Doc A/CONF.151/PC/WG.III/L.8/Rev.1 and Add.1 and 2 [38] quoted in Duvic-Paoli and Viñuales, above n 99, 111.
[102] Duvic-Paoli and Viñuales, above n 99, 111.
[103] Ibid.
[104] See Donald R Rothwell et al, *International Law: Cases and Materials with Australian Perspectives* (Cambridge University Press, 2011), 561.

The focus on sustainable development has been criticised by some legal scholars as having detracted from the *Rio Declaration*'s overall contribution to international law for the prevention of harm to the environment. According to Nanda and Pring, the content of the *Rio Declaration* 'pales in comparison to the multiple Stockholm provisions mandating the safeguarding of natural resources and ecosystems'. [105] However, such criticisms overlook the fact that the *Rio Declaration* went beyond the scope of the *Stockholm Declaration*, outlining a number of procedural measures that support the prevention of transboundary harm and harm to the global commons. For example, principle 14 discourages the relocation and transfer to other states of dangerous activities or substances. Principle 15 encourages states to apply a precautionary approach when conducting risky activities, stating that '[w]here there are threats of serious or irreversible damage, lack of full scientific certainty shall not be used as a reason for postponing cost-effective measures to prevent environmental degradation.' Principle 17 asserts that states shall undertake an environmental impact assessment for all 'proposed activities that are likely to have a significant adverse impact on the environment'. Principle 19 declares that for such activities, states must also notify and consult with other potentially affected states.

Unlike the no-harm rule itself, at the time of the *Rio Declaration* these procedural obligations may not have been a part of customary international law.[106] However, according to Birnie, Boyle and Redgwell, their inclusion in the *Rio Declaration* reflected contemporary developments in international law and state practice concerning transboundary harm.[107] Birnie, Boyle and Redgwell argue that the *Rio Declaration* therefore provided a 'strong starting point for the further elaboration of this part of international environmental law by the International Court of Justice and the International Law Commission.'[108] As demonstrated in chapter four, the procedural obligation to notify and consult had already been briefly considered in early cases. States, jurists and the International Law Commission would continue to emphasise its importance over the coming decades.

[105] Nanda and Pring, above n 2, 271.
[106] See Handl, '*Declaration of the United Nations*', above n 94.
[107] Birnie, Boyle and Redgwell, above n 28, 138.
[108] Birnie, Boyle and Redgwell, above n 28, 138.

5.5 1996: INTERNATIONAL COURT OF JUSTICE ADVISORY OPINION ON THE LEGALITY OF THE THREAT OR USE OF NUCLEAR WEAPONS

On 15 December 1994, the General Assembly adopted resolution 49/75K, which requested that the ICJ provide an advisory opinion as to whether the threat or use of nuclear weapons was permitted under international law.[109] The question was hypothetical, without reference to the activities of specific states.[110] However, it was posed in a heated political context. On one hand, there were growing calls within the international community for elimination of nuclear weapons. According to Matheson, the request was championed by a coalition of governments and NGO's with the overall goal of complete nuclear disarmament.[111] On the other hand there were states against complete disarmament, such as the United States and Russia. Furthermore, France had recently resumed nuclear weapons testing in the Pacific.[112] It was against this context that the ICJ delivered its advisory opinion.

As an advisory opinion, the decision of the ICJ is authoritative but non-binding on states, but it nonetheless represents an important milestone in the development of the no-harm rule. The broad framing of the question gave the ICJ scope to consider numerous rules of international law. This led the ICJ to consider the no-harm rule and recognise the extended no-harm rule for the global commons as customary international law.

In answering the question before it, the Court firstly had to decide what international laws were relevant to assess the legality of the use of nuclear weapons.[113] The majority of the Court held that the most 'directly relevant applicable law' was international law relating to the use of force.[114] The advisory opinion therefore primarily considers this area of international law. However, the majority of the Court also recognised that other international laws might apply to the threat or use of nuclear weapons. It considered the International Covenant on Civil and Political Rights[115] and the prohibition against genocide[116] to be potentially relevant, but the

[109] *Request for an advisory opinion from the International Court of Justice on the legality of the threat or use of Nuclear Weapons*, GA Res 49/75K, UN GAOR, 49th sess, 90th mtg, UN Doc A/RES/49/75 (15 December 1994). The UNGA may request an advisory opinion from the ICJ on a legal question under article 96(1) of the *Charter of the United Nation.* This was one of two requests made to the ICJ. The other request was from the WTO. See Michael J. Matheson, 'The Opinions of the International Court of Justice on the Threat or Use of Nuclear Weapons' (1997) 91(3) *The American Journal of International Law* 417, 417.
[110] Matheson, above n 109, 420.
[111] Ibid, 420.
[112] See section 5.3.2 above.
[113] *Nuclear Weapons (Advisory Opinion)* [1996] ICJ Rep 226, 239.
[114] Ibid, 242 [34].
[115] *Nuclear Weapons (Advisory Opinion)* [1996] ICJ Rep 226, 239-240.
[116] Ibid, 240.

application of these rules was dependant on the specific circumstances of any future use of nuclear weapons. As such, the majority opinion did not analyse them in great detail.

The majority also briefly considered the relevance of international law for the protection of the environment.[117] In doing so, they stated the following:

> The Court recognizes that the environment is under daily threat and that the use of nuclear weapons could constitute a catastrophe for the environment. The Court also recognizes that the environment is not an abstraction but represents the living space, the quality of life and the very health of human beings, including generations unborn. *The existence of the general obligation of States to ensure that activities within their jurisdiction and control respect the environment of other States or of areas beyond national control is now part of the corpus of international law relating to the environment*.[118] (emphasis added)

The majority of the Court qualified this obligation in the context of armed conflict.[119] It held that international law for the protection of the environment was not intended to deprive states of the right to act in self-defence.[120] States need only take environmental considerations into account when assessing whether their response to a threat is necessary and proportionate.[121] Therefore, according to this interpretation the no-harm rule does not prohibit the use of nuclear weapons in armed conflict.

The wording of the above statement reflects the formulation of the no-harm rule in *Stockholm* principle 21 and *Rio* principle 2 in that it extends the no-harm rule to the global commons. A number of states had cited these principles in their written and oral submissions in this case.[122] The majority decision did not reiterate principle 21/ principle 2 verbatim. It used the word 'respect' instead of 'do not cause damage'. According to Sands and Peel, the ICJ did not intend to significantly alter the content of the no-harm rule with this change in language.[123] However, the use of the term 'respect' could be interpreted as changing the content of the no-harm rule. On the one hand, it could be interpreted as broadening the scope of the no-harm rule to include circumstances of transboundary interference and interference with the global commons where no physical harm has occurred.[124] On the other hand, 'respect' could also be interpreted as

[117] Ibid, 241.
[118] Ibid, [29].
[119] Cf *Nuclear Weapons (Advisory Opinion)* [1996] ICJ Rep 226, 433 (Weeramantry J). Judge Weeramantry was of the opinion that the use of Nuclear Weapons is illegal in all circumstances. See also *Nuclear Weapons (Advisory Opinion)* [1996] ICJ Rep 226, 566 (Koroma J). Judge Koroma held that the use of nuclear weapons is illegal, even in cases of self-defence.
[120] *Nuclear Weapons (Advisory Opinion)* [1996] ICJ Rep 226, [30].
[121] Ibid.
[122] Ibid, [27].
[123] Sands and Peel, above n 3, 199.
[124] Ibid, 199 nn 72. As noted above, this issue was previously raised in the *Nuclear Tests* cases.

implying a lower standard of care compared to the formulation under *Stockholm* principle 21/*Rio* principle 2.

The opinions of dissenting judges in the *Nuclear Weapons Advisory Opinion* offer a different perspective on the no-harm rule. Judge Weeramantry was of the opinion that the no-harm rule, flowing from the *Corfu Channel* case, *Stockholm* principle 21 and *Rio* principle 2, creates a positive obligation for states to *improve* the environment, rather than merely refrain from causing harm.[125] He disagreed with the majority of the Court that states need only take protection of the environment into account during an armed conflict. Instead, he argued that the use of nuclear weapons would breach the no-harm rule:

> [A]ny State action which damages the environment in the way that nuclear weapons do is a violation of the obligation of environmental protection which modern international law places upon States. A contrary view would negative the basic logic of environmental law and send a tremor through the foundations of this vital subdiscipline of modern international law.[126]

Similarly, Judge Koroma disagreed with the majority's approach to the protection of the environment. Koroma argued that, when considering the legality of the use of nuclear weapons in the context of international environmental law, the relevant issue was not whether the no-harm rule would deny a state the right to self-defence, but the impact nuclear weapons would have on the environment.[127] In his opinion, the majority should have considered the radioactive effects of nuclear weapons, and their widespread contamination of the natural and human environment.[128] His argument implies that the use of nuclear weapons would likely breach the no-harm rule for this reason. However, as dissenting opinions, these are less authoritative interpretations of the no-harm rule.

Neither the advisory opinion nor dissenting opinions went so far as to elaborate further on the content of the no-harm rule. However, the dissenting opinions suggest that the no-harm rule is not merely custom but a fundamental rule of international law. Weeramantry and Koroma did not go so far as to explicitly categorise the duty to prevent transboundary harm and harm to the global commons as a *jus cogens* norm.[129] However, their analyses suggests that the no-harm

[125] Legality the Use by a State of Nuclear Weapons in Armed Conflict (Advisory Opinion) [1996] ICJ Rep 66, 141 (Weeramantry J). Judge Weeramantry referred to this in his dissenting opinion in the *Nuclear Weapons* advisory opinion, stating that it was supplementary to his consideration of environmental law in that case. See *Nuclear Weapons (Advisory Opinion)* [1996] ICJ Rep 226, 506 (Weeramantry J).
[126] Ibid, 142.
[127] *Nuclear Weapons (Advisory Opinion)* [1996] ICJ Rep 226, 578 (Koroma J).
[128] Ibid.
[129] Weeramantry does go so far as to suggest that the no-harm rule is an obligation *erga omnes*. *Legality the Use by a State of Nuclear Weapons in Armed Conflict (Advisory Opinion)* [1996] ICJ Rep 66, 142.

rule cannot be derogated from by other international laws, even one as paramount as the right of self-defence.

5.6 1997: THE GABČÍKOVO-NAGYMAROS PROJECT (HUNGARY V SLOVAKIA)

In 1997, the year following the *Nuclear Weapons* advisory opinion, the ICJ handed down its judgment in the *Case Concerning the Gabčíkovo-Nagymaros Project ('Gabčíkovo-Nagymaros Project').*[130] The dispute involved the interpretation and termination of a joint agreement between Hungary and Slovakia concerning a system of dams along a section of the Danube River between the two states.[131] In 1977, Hungary and Czechoslovakia (Slovakia became an independent state in 1993)[132] entered into a treaty for the joint construction and operation of the dams. The object of the agreement was to ensure that the project did not impact on the water quality of the Danube, and to guarantee that each party would comply with its obligations in constructing and operating the dams.[133] In 1989, Hungary suspended and abandoned work on its part of the project. One of the questions before the Court was whether Hungary was entitled to do this and thereby terminate the treaty under international law.[134]

In its judgment, the majority of the ICJ repeated its dictum from the *Nuclear Weapons* advisory opinion, acknowledging the no-harm rule as a principle of customary international law.[135] Despite this recognition and the environmental issues inherent in this case, the majority did not consider whether the no-harm rule had been breached.[136] One of the justifications put forth by Hungary for terminating the treaty with Slovakia was that performance of the treaty conflicted with new principles of international environmental law that had subsequently developed.[137] Hungary's argument drew attention to the precautionary principle and emerging procedural obligations of the duty to cooperate, consult and notify other states, and the duty to conduct an environmental impact assessment. The content of the no-harm rule was not expressly

[130] *Case Concerning the Gabçikovo-Nagymaros Project (Hungary v Slovakia)* (Merits) [1997] ICJ Rep 7, 41 ('*Gabçikovo-Nagymaros Project').*
[131] Stephens, above n 34, 174.
[132] Slovakia became an independent state on the 1st January 1993. See ibid, [25]
[133] Ibid, 20-24.
[134] Ibid, 11.
[135] Ibid, [53].
[136] See Stephen Stec and Gabriel E. Eckstein, 'Of Solemn Oaths and Obligations: The Environmental Impact of the ICJ's Decision in the Case Concerning the Gabcíkovo-Nagymaros Project' (1998) 8(1) *Yearbook of International Environmental Law* 41, 46.
[137] *Gabçikovo-Nagymaros Project* [1997] ICJ Rep 7, [97].

considered in the majority judgment.[138] However, the arguments raised by Hungary nevertheless signalled the direction of the future development of the no-harm rule.

5.6.1 The no-harm rule and emerging procedural obligations

In its memorial to the Court, Hungary associated the precautionary principle with the no-harm rule. The precautionary principle had been expressed in principle 15 of the *Rio Declaration*, but unlike the no-harm rule was generally considered to be soft law and hence non-binding. Hungary stated that the '[m]ain principle of international environmental law is that environmental degradation must be prevented.'[139] That is, the no-harm rule is an overarching principle of customary international law. It suggested that the precautionary principle was not distinct from the no-harm rule, but merely a more developed form.[140] Hungary stated that:

> The effective application of the obligation of prevention can be jeopardised, due to scientific uncertainty, and this can result in irremediable environmental damage. Thus, action must be taken at an early stage based upon models of potential consequences.[141]

On this view, the precautionary principle is integral to the function of the no-harm rule as it might enable it to respond to risks of future harm even in light of scientific uncertainty. While Hungary did not explicitly state so, this characterisation implies that the precautionary principle is, by association, also a binding principle of customary international law.

Hungary drew a similar connection between the no-harm rule and the duty to cooperate. It stated that 'the prevention and the control of environmental deterioration is necessarily based on cooperation between the concerned states.'[142] It referred to the principle flowing from the *Lake Lanoux* arbitration: that states must enter into meaningful negotiations with one another concerning activities that risk causing transboundary harm.[143] Hungary also referred to the duty to notify and consult with other states regarding activities that may have a significant effect on the environment of other States.[144] It further implied the obligation to conduct an

[138] See also Phoebe N. Okowa and Malcolm D. Evans, 'Case concerning the Gabçikovo-Nagymaros Project (Hungary/Slovakia)' (1998) 47(3) *The International and Comparative Law Quarterly* 688, 694. Okowa and Evans note that it is regrettable that the ICJ did not use this as an opportunity to consider issues of international environmental law in greater detail. But see Birnie, Boyle and Redgwell, above n 28, 139. They see this as one of the most important ICJ judgments on an environmental dispute.
[139] 'Memorial of Hungary volume 1' *Gabçikovo-Nagymaros Project (Hungary v Slovakia)* [1994] ICJ Pleadings 1, [6.63].
[140] Ibid, [6.64].
[141] Ibid, [6.67].
[142] Ibid, [6.70].
[143] Ibid, [6.76]-[6.82].
[144] Ibid, [7.57].

environmental impact assessment and communicate the findings was also a part of the duty to consult and notify.[145]

These interpretations were not further examined in this case. In its counter-memorial, Slovakia did not specifically address these emerging duties. It merely argued that it did not consider there to be any binding, peremptory norms of international environmental law that could override the provisions of the treaty.[146] Moreover, it claimed that the principles asserted by Hungary were too general to override the provisions of the treaty under the principle of *lex specialis*.[147] The majority of the Court also did not take this opportunity to examine the relationship between the no-harm rule, the precautionary principle and other procedural obligations. It merely stated that the treaty in question was not static and that new norms of international environment law (without specifying which ones) may have been incorporated by the parties through a process of consultation and negotiation.[148]

The reluctance of the Court to consider and apply these emerging norms of customary international law has been criticised by legal scholars. According to Stec and Eckstein, the Court had the opportunity to examine and apply the precautionary principle, but instead chose to take a conservative approach in its judgment.[149] Okowa and Evans suggest that, in making the generalised statement that the treaty ought to be interpreted in light of new norms of international environmental law, the majority of the Court implied that that the precautionary principle and other developing norms of international law had in fact become binding 'hard law' rules, without examining state practice and *opinio juris*.[150] Boyle[151] and Stephens[152] similarly point out that the majority did not clarify *why* such norms ought to be taken into account. The fact that the Court did not consider the relationship of these emerging norms to the no-harm rule suggests that, at the time of the *Gabčíkovo-Nagymaros Project* this relationship remained unclear.

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[145] 'Memorial of Hungary volume 1' *Gabçikovo-Nagymaros Project (Hungary v Slovakia)* [1994] ICJ Pleadings, [7.59]. Hungary referred to the *Convention on Environmental Impact Assessment in a Transboundary Context*, opened for signature 25 February 1991, 1989 UNTS 309 (entered into force 10 September 1997) ('*Espoo Convention*'). Slovakia was not party to the *Espoo Convention*, but Hungary argued that Slovakia was nevertheless bound by similar provisions in its domestic law (at [7.59]).
[146] 'Memorial of Slovakia Volume 1', *Gabçikovo-Nagymaros Project (Hungary v Slovakia)* [1994] ICJ Pleadings, 347-349.
[147] Ibid, 347-349.
[148] *Gabçikovo-Nagymaros Project* [1997] ICJ Rep 7, 67-68.
[149] Stec and Eckstein, above n 136, 42. See also Nanda and Pring, above n 2, 89.
[150] Okowa and Evans, above n 138, 695.
[151] A E Boyle, 'The *Gabčíkovo-Nagymaros* Case: New Law in Old Bottles ' (1997) 8 *Yearbook of International Environmental Law* 13, 15.
[152] Stephens, above n 34, 184.

Hungary's characterisation of the no-harm rule as an overarching legal principle from which other procedural obligations are derived therefore appears to be progressive and may not have reflected the understanding of other states at that time. However, this approach signifies a growing focus on the duty of due diligence and procedural obligations. This focus is sharpened and further developed in the next phase in the development of the no-harm rule.

5.7 CONCLUSION

This chapter has examined the no-harm rule during its second phase of development. During this phase, the no-harm rule was developed beyond the original *sic utero* formulation that was seen in the early *Trail Smelter* arbitration and *Corfu Channel* case. The no-harm rule remained grounded in balancing the rights of states, but was nevertheless reformulated to take on a stronger environmental focus. This new focus is especially evident in the way in which states (through the *Stockholm* and *Rio* declarations) extended the scope of the no-harm rule to include harm to the global commons. While there may have been some doubt earlier on as to the status of the extended no-harm rule, the decision of the ICJ in the *Nuclear Weapons* advisory opinion leaves no doubt that states have an obligation under customary international law to prevent activities under their jurisdiction and control from harming the global commons. Finally, and perhaps most significantly, key sources during this phase indicate that states now had a positive obligation to prevent environmental harm to the territory of other states and to the global commons. That is, states had an obligation that extended beyond merely compensating for harm after it had been caused.

However, important aspects of the content of the no-harm rule remained unclear during this phase. By the end of this phase it was clear that states had a positive obligation to prevent harm, but it was not yet clear exactly what this entailed. The sources examined in this chapter also do not provide clear guidance as to whether the severity of harm must reach a certain threshold level in order to give rise to obligations under the no-harm rule. It was during the third phase of the no-harm rule's development that these issues were further clarified.

6 Phase Three of the Development of the No-Harm Rule 2001-2016: Due Diligence and Procedural Obligations

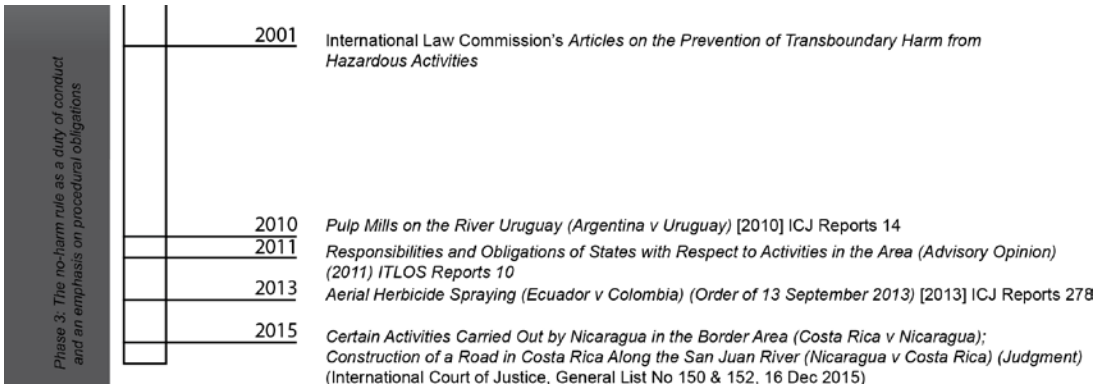
6.1 INTRODUCTION

Chapter five examined the second phase in the development of the no-harm rule. The beginning of this phase was marked by principle 21 of the *Stockholm Declaration*. In this phase, the scope of the no-harm rule was extended to apply to harm to the global commons. The no-harm rule was reformulated in key sources with a stronger environmental focus. It was also reformulated to provide states with a positive duty to prevent transboundary harm and harm to the global commons, rather than merely hold states responsible for harm after it had been caused. However, significant aspects of the content of the no-harm rule remained unclear. *Stockholm* principle 21, *Rio* principle 2 and the ICJ's *Nuclear Weapons* advisory opinion did not clearly state a threshold level of harm necessary to trigger application of the no-harm rule. Key sources also did not clearly articulate the standard of care for states to discharge their obligations under the no-harm rule. While some sources, such as the *Rio Declaration* and the submission of Hungary in the *Gabčíkovo-Nagymaros Project*, indicated that there were procedural obligations related to the no-harm rule, such procedural obligations were not yet accepted as part of customary international law and their relationship to the no-harm rule remained unclear. Consequently, the precise content of the no-harm rule and what states needed to do to satisfy their obligations under it remained unresolved.

This chapter examines the third phase in the development of the no-harm rule. Key sources in this phase clarified the scope and standard of care of the no-harm rule. In particular, the no-harm rule is characterised as providing states with a duty of conduct or 'due diligence' to prevent harm. Additionally, procedural obligations that had begun to gain traction in state practice during the previous phase, such as the duty to conduct an environmental impact assessment (EIA) and to consult and notify with other potentially affected states, are seen as following from the no-harm rule during this phase. That is, they are seen as integral to fulfilling the duty of due diligence to prevent significant transboundary harm.

Phase three is illustrated in the timeline below:

Figure 6.1 Timeline of phase three of the development of the no-harm rule



This phase is heralded by the International Law Commission's 2001 *Draft Articles on the Prevention of Transboundary Harm* (‘*Draft Articles on Prevention’*),[1] an attempt by the ILC to codify and progressively develop the no-harm rule and associated procedural obligations. The *Draft Articles* are discussed in section 6.2. Section 6.3 examines the 2010 decision of the ICJ in *Pulp Mills on the River Uruguay* (‘*Pulp Mills*’).[2] In this case, the ICJ affirmed the no-harm rule as a duty of due diligence and significantly contributed to the understanding of states and legal scholars regarding the procedural obligation to conduct an EIA. Section 6.4 analyses the 2011 advisory opinion of the Seabed Disputes Chamber of the International Tribunal for the Law of the Sea in *Responsibilities and Obligations of States with Respect to Activities in the Area* (‘*Activities in the Area*’)[3]. In focusing on the liability of states under Part XI of the *United Nations Convention on the Law of the Sea* (‘*UNCLOS*’), the Seabed Dispute Chamber also considered the content of the no-harm rule as a principle of customary international law. Section 6.5 addresses the *Case Concerning Aerial Herbicide Spraying* (‘*Aerial Herbicide Spraying’*)[4] between Ecuador and Colombia. This contentious case was settled in 2013 privately between the Parties before oral hearings could be heard and a judgment rendered.[5] However, the no-harm rule was central to this case, and the written submissions of Ecuador

[1] ‘Draft Articles on Prevention of Transboundary Harm from Hazardous Activities, with Commentaries’ (2001) II(2) *Yearbook of the International Law Commission*, 149 (‘*Draft Articles on Prevention*’).
[2] *Pulp Mills on the River Uruguay (Argentina v Uruguay) (Judgment)* [2010] ICJ Rep 14 (‘*Pulp Mills’*).
[3] *Responsibilities and Obligations of States Sponsoring Persons and Entities with Respect to Activities in the Area (Advisory Opinion)*, [2011] ITLOS Reports 10 (‘*Activities in the Area’*).
[4] *Aerial Herbicide Spraying (Ecuador v Colombia) (Order of 13 September 2013)* [2013] ICJ Rep 278 (‘*Aerial Herbicide Spraying*’).
[5] Ibid.

and Colombia raise significant questions concerning the application of this rule and demonstrate how two states understand the duty of due diligence.[6] Finally, section 6.6 analyses the judgment of the ICJ in two recent cases involving Costa Rica and Nicaragua: *Certain Activities Carried out by Nicaragua in the Border Area* and *Construction of a Road in Costa Rica along the San Juan River* (*Certain Activities*).[7] These cases were joined in 2013[8], and the ICJ rendered its judgment in December 2015. This is the first time the ICJ has applied the no-harm rule in a contentious case (as opposed to merely considering it in *obiter dicta*) since the 1949 *Corfu Channel* case. The ICJ's judgment further clarifies the procedural obligations to conduct an EIA and consult and notify with other states. However, the ICJ's approach to the standard of care in this case muddies the waters. It can be interpreted as suggesting that states may also have a duty of result under the no-harm rule. *Certain Activities* may therefore mark the beginning of a fourth phase in the development of the no-harm rule.

6.2 2001: THE INTERNATIONAL LAW COMMISSION'S DRAFT ARTICLES ON THE PREVENTION OF TRANSBOUNDARY HARM FROM HAZARDOUS ACTIVITIES

The International Law Commission (ILC) is as an international body established by the UN General Assembly in 1947 to codify and progressively develop international law.[9] In 1974, the ILC embarked on a project to codify, clarify and progressively develop *International liability for injurious consequences arising out of acts not prohibited by international law.*[10] The original aim of this project was to spell out the content of the duty to prevent transboundary harm and establish rules of liability for transboundary harm once it had been caused.[11] In 1997,

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[6] See Alan Boyle, 'Transboundary air pollution: a tale of two paradigms ' in S Jayakumar et al (eds), *Transboundary Pollution: Evolving Issues of International Law and Policy* (Edward Elgar, 2015) 233, 235.

[7] *Certain Activities Carried Out by Nicaragua in the Boarder Area (Costa Rica v Nicaragua) & Construction of a Road in Costa Rica Along the San Juan River (Nicaragua v Costa Rica) (Judgment)* (International Court of Justice, General List No 150 & 152, 16 December 2015) ('*Certain Activities'*)

[8] *Certain Activities Carried out by Nicaragua in the Border Area (Costa Rica v Nicaragua) (Order of 17 April 2013)* [2013] ICJ Rep 166; *Construction of a Road in Costa Rica Along the San Juan River (Nicaragua v Costa Rica) (Order of 17 April 2013)* [2013] ICJ Rep 184.

[9] The ILC was created by UN General Assembly by *Establishment of an International Law Commission*, GA Res 174, UN GAOR, 2nd sess, 123rd mtg, (21 November 1947). The *Statute of the International Law Commission* is contained therein. The object of the ILC is set out under article 1(1). The mandate of the ILC stems from article 13(1)(a) of the *Charter of the United Nations*.

[10] See 'Report of the International Law Commission on the work of its twenty-sixth session (6 May-26 July 1974)' [1974] II(1) *Yearbook of the International Law Commission*, 305 [163]. This project was originally proposed by the Sixth Committee of the UN General Assembly in 1973. See Report of the International Law Commission, GA Res 3071, UN GAOR, 6th Comm, 28th sess, 2186th mtg, UN Doc A/RES/3071(XXVIII) (30 November 1973).

[11] See 'Preliminary report on international liability for injurious consequences arising out of acts not prohibited by international law, by Mr. Robert Q. Quentin-Baxter, Special Rapporteur' [1980] II(1) *Yearbook of the International Law Commission* 247, 262-266.

the ILC decided to split the topic in two, separating prevention of harm from liability.[12] This was largely because of key differences between the scope of each topic.[13] This decision resulted in two draft documents: the 2001 *Articles on the Prevention of Transboundary Harm from Hazardous Activities*[14] (‘*Draft Articles on Prevention*’) and the 2006 *Draft Principles on the allocation of loss in the case of transboundary harm arising out of hazardous activities* (‘*Draft Principles on Loss*’).[15] The *Draft Principles on Loss* address the issue of liability for private (i.e. non-state) actors for transboundary harm. As such, they are not directly relevant to the interpretation of the content of the no-harm rule. By contrast, the *Draft Articles on Prevention* deal with the content of the no-harm rule and the procedural obligations that flow from it for states.

The *Draft Articles on Prevention* provide a non-binding interpretation of the no-harm rule and related procedural obligations. The ILC is comprised of international legal experts who act in their personal capacity, and not as official state representatives.[16] As such, the *Draft Articles on Prevention* are technically akin to the works of prominent publicists within the hierarchy of international law sources set out under article 38(1) of the Statute of the ICJ.[17] Moreover, the ILC does not clearly distinguish between the codification of existing customary international law and progressive development within its projects.[18] The *Draft Articles on Prevention* draw heavily on prior interpretations of the no-harm rule, including the *Trail Smelter* arbitration, *Stockholm* principle 21 and *Rio* principle 2.[19] However, they contain a mixture of codified customary law, emerging legal principles and progressive development where state practice and jurisprudence was lacking or inconclusive.[20] Consequently, the formulation of the no-harm

[12] See ‘International Liability for Injurious Consequences Arising out of Acts not Prohibited by International Law, Report of the Working Group’, International Law Commission, 49th sess (12 May – 18 July 1997) A/CN.4/L/536 1997, 2 [3].
[13] See Pemmaraju Sreenivasa Rao, ‘First report on prevention of transboundary damage from hazardous activites’, International Liability for Injurious Consequences Arising out of Acts not Prohibited by International Law, (1998) International Law Commission, UN Doc A/CN.4/487 and Add.1, 182-183.
[14] *Draft Articles on Prevention*, above n 1.
[15] ‘Draft principles on the allocation of loss in the case of transboundary harm arising out of hazardous activities’, [2006] II(2) *Yearbook of the International Law Commission* 59.
[16] International Law Commission, *Membership* (20 July 2015) International Law Commission <http://legal.un.org/ilc/ilcmembe.shtml#a5>
[17] Fernando Lusa Bordin, 'Reflections of Customary International Law: The Authority of Codification Conventions and ILC Draft Articles in International Law' (2014) 63(03) *International & Comparative Law Quarterly* 535, 537.
[18] See International Law Commissions, *About the Commission: Organization, programme and methods of work-Methods of Work* (12 January 2016) International Law Commission <http://legal.un.org/ilc/methods.shtml>.
[19] See also Timothy Stephens, *International Courts and Environmental Protection* (Cambridge University Press, 2009) 157.
[20] See definitions of progressive development and codification in article 15 of the *Statute of the International Law Commission*.

rule contained in the *Draft Articles on Prevention* may not entirely accord with the understanding and practice of states. Nonetheless, the *Draft Articles on Prevention* have significantly shaped how states,[21]jurists[22] and legal scholars[23] understand the scope of the no-harm rule and its duty of care. The *Draft Articles on Prevention* have been praised for providing a more precise interpretation of the no-harm rule than other sources[24] and several legal scholars have expressed the opinion that they reflect existing customary international law.[25]

6.2.1 The scope of the Draft Articles on Prevention

The *Draft Articles on Prevention* specifically focus on so-called 'hazardous' activities that present a risk of future harm. The ILC's rationale for this focus was that the prevention of transboundary harm is preferable to compensation after it has occurred.[26] The duty to prevent transboundary harm is reformulated in draft article 3, which states that '[t]he State of origin shall take all appropriate measures to prevent significant transboundary harm or at any event to minimize the risk thereof.'[27] The focus of the *Draft Articles on Prevention* is therefore the management of risk.[28] The ILC's interpretation of the no-harm rule in the *Draft Articles on Prevention* therefore reflects this approach. The *Draft Articles* take for granted that risk of transboundary harm is foreseeable.[29] As such, the *Draft Articles on Prevention* only apply to activities that pose a reasonably foreseeable risk of transboundary harm.[30]

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[21] See, eg, 'Memorial of Ecuador' *Arial Herbicide Spraying (Ecuador v Colombia)* International Court of Justice, General List No 138, 29 April 2009, 273, 278-280, 282, 286-287; 'Memorial of Costa Rica Volume I' *Certain Activities Carried out by Nicaragua in the Border Area (Costa Rica v Nicaragua)*, General List no 150 (5 December 2011) [5.6]; 'Memorial of Nicaragua Volume I' *Construction of a Road in Costa Rica Along the San Juan River (Nicaragua v Costa Rica)* General List no 152 (19 December 2012) 142, 144, 146, 174.
[22] See, eg, *Activities in the Area*, [2011] ITLOS Reports 10, [116] ('*Activities in the Area*').
[23] See, eg, Jacqueline Peel, 'Unpacking the elements of a state responsibility claim for transboundary pollution ' in S Jayakumar et al (eds), *Transboundary Pollution: Evolving Issues of International Law and Policy* (Edward Elgar 2015) 51, 67; Boyle, above n 6, 233, 237; David Reichwein et al, 'State Responsibility for Environmental Harm from Climate Engineering' (2015) 5(2-4) *Climate law* 142, 155.
[24] Pierre-Marie Dupuy and Cristina Hoss, 'Trail Smelter and Terrorism: International Mechanisms to Combat Transboundary Harm' in Rebecca M Bratspies and Russell A Miller (eds), *Transboundary Harm in International Law: Lessons from the Trail Smelter Arbitration* (Cambridge University Press 2006) 225, 230.
[25] See Patricia Birnie, Alan Boyle and Catherine Redgwell, *International Law and the Environment* (Oxford Univerity Press, 3rd ed, 2009), 141. They describe the *Draft Articles on Prevention* as an 'authoritative exposition of the existing law'. See also Roda Verheyen, *Climate Change Damage and International Law: Prevention Duties and State Responsibility* (Koninklijke Brill NV, 2005), 154; Catherine Redgwell, 'Transboundary pollution: principles, policy and practice ' in S Jayakumar et al (eds), *Transboundary Pollution: Evolving Issues of International Law and Policy* (Edward Elgar, 2015) 11, 15.
[26] *Draft Articles on the Prevention*, above n 1, 148.
[27] Ibid, 153.
[28] Ibid, 150.
[29] Boyle, above n 6, 237.
[30] Birnie, Boyle and Redgwell, above n 25, 142.

The scope of the *Draft Articles on Prevention* (and hence the duty to prevent transboundary harm) is set out in draft articles 1 and 2. The duty only applies to activities that are not otherwise prohibited under international law.[31] Prohibited activities are dealt with in the ILC's 2001 draft articles on the *Responsibility of States for Internationally Wrongful Acts*.[32] The *Draft Articles on Prevention* also only apply to physical harm, being 'harm caused to persons, property or the environment'.[33] Non-physical harm, such as pure economic loss is therefore beyond the scope of the *Draft Articles on Prevention*. They also only apply to activities that are to take place within the territory, jurisdiction or control of a state.[34] This includes activities undertaken from a ship flying the flag of a state.[35] The scope extends to activities that take place in areas that a state has significant control over but over which it may not have individual sovereign rights.[36] This would include activities undertaken during the unlawful occupation of another state's territory.[37]

The *Draft Articles on Prevention* only apply to risks of harm above a certain threshold level of severity. Activities must 'involve a risk of causing significant transboundary harm'.[38] This reflects the no-harm rule as formulated in the *Trail Smelter* arbitration and the *Lake Lanoux* arbitration.[39] The commentaries acknowledge that the meaning of 'significant' harm is ambiguous and will need to be determined on a case-by-case basis. The *Draft Articles* nevertheless outline a broad definition, being 'something more than "detectable" but need not be at the level of "serious" or "substantial".'[40] It also provides a composite definition of 'risk of causing significant transboundary harm', being 'high probability of causing significant transboundary harm and a low probability of causing disastrous transboundary harm'.[41] This definition combines magnitude of harm with probability of harm to create a spectrum. The ILC intended this spectrum to encompass activities which fall between four margins: low to high probability and significant to disastrous severity.[42] This spectrum brings 'ultra-hazardous'

[31] *Draft Articles on Prevention,* above n 1, 150.
[32] *Draft Articles on Responsibility of States for Internationally Wrongful Acts, with commentaries* (2001) II(2) *Yearbook of the International Law Commission*, 31.
[33] *Draft Articles on Prevention,* above n 1, 151-152.
[34] Ibid, 150.
[35] Ibid.
[36] Ibid, 151.
[37] Ibid.
[38] Ibid, 149 art 1.
[39] Ibid, 152.
[40] Ibid.
[41] Ibid, 151-152.
[42] *Draft Articles on the Prevention,* above n 1, 152. The commentaries specifically state that it was the intention of the commission to create a spectrum between these two classifications of risk of harm.

activities within the scope of the *Draft Articles on Prevention*, such as the risks of transboundary harm posed by nuclear activities.[43]

Finally, scope of the *Draft Articles on Prevention* is limited to transboundary harm, being harm to the territory of another state.[44] The *Draft Articles on Prevention* therefore do not address harm to the global commons. Harm to the global commons was originally considered early on in the development of this project. In 1990, Special Rapporteur Barboza advocated addressing harm to the global commons under the ILC's mandate of progressive development. [45] However, it was later noted by Special Rapporteur Rao that some states were of the view that harm to the global commons was a separate issue that warranted independent consideration by the ILC. [46] It therefore was not included in the final draft.

6.2.2 The standard of care and procedural obligations under the Draft Articles on Prevention

The standard of care under the *Draft Articles on Prevention* is a duty of conduct or 'due diligence'. That is, states must exert their 'best possible efforts to minimize the risk' of transboundary harm. [47] This standard of care reflects contemporary developments in international treaty law.[48] According to the commentaries to the *Draft Articles* 'the duty of due diligence… is not intended to guarantee that significant harm be totally prevented, if it is not possible to do so.'[49] As such, a state would not automatically be considered to have breached its obligations under the *Draft Articles* simply because an activity within their jurisdiction or control results in significant transboundary harm. [50] It would instead have to be shown that a

[43] *Draft Articles on the Prevention,* above n , 149. See also Stephens, above n 19, 157; Birnie, Boyle and Redgwell, above n 25, 141. According to Birnie, Boyle and Redgwell, this definition includes situations like the Chernobyl nuclear disaster, where there is an unlikely risk of disastrous transboundary consequences.
[44] *Draft Articles on the Prevention,* above n 1, 152 art 2.
[45] Julio Barboza, 'Sixth report on international liability for injurious consequences arising out of act not prohibited by international law', International Law Commission, (1990) Un Doc A/CN.4/428, 101 [72], [74].
[46] Pemmaraju Sreenivasa Rao, 'First report on prevention of transboundary damage from hazardous activities', International Liability for Injurious Consequences Arising out of Acts not Prohibited by International Law, (1998) International Law Commission, UN Doc A/CN.4/487 and Add.1, 198 [107]-[109].
[47] *Draft Articles on the Prevention,* above n 1, 153.
[48] Due diligence obligations had become prevalent in international environmental agreements. See, eg, *United Nations Convention on the Law of the Sea*, opened for signature 10 December 1982, 1833 UNTS 3 (entered into force 16 November 1994) ('*UNCLOS*') art 194; *Vienna Convention for the Protection of the Ozone Layer*, opened for signature 22 March 1985, 1513 UNTS 293 (entered into force 22 September 1988) art 2. This standard of care had also been implied by Hungary in the *Gabčíkovo-Nagymaros Project*. See chapter 5. The ILC also referred to the dispute between Germany and Switzerland concerning the 1986 Sandoz chemical spill in support of this standard of care. See also *Draft Articles on Prevention,* above n 1, 154.
[49] *Draft Articles on the Prevention,* above n 1, 154.
[50] See Boyle, above n 6, 237. According to Boyle, breach would not be established by showing a risk of harm or that actual harm was caused. Proof of harm or risk of harm merely establishes that 'the State has a duty to act' and does not tell us 'that the State has failed in its duty to act.'

state did not take sufficient measures to minimise the risk (i.e. did not exercise reasonable due diligence in the given circumstances).[51]

Under the *Draft Articles on Prevention*, the degree to which a state must attempt to minimise the risk of transboundary harm will depend on the probability and severity of the risk at hand.[52] In other words, the degree of due diligence required by a state is proportionate to the risk.[53] The *Draft Articles on Prevention* also suggest that the degree of due diligence may change over time with advances in scientific understanding and technology.[54] However, generally speaking, due diligence will involve 'reasonable efforts by a State to inform itself of factual and legal components that relate foreseeably to a contemplated procedure and to take appropriate measures, in a timely fashion, to address them.'[55] This includes enacting and enforcing relevant domestic law and policies.[56] Additional procedural obligations articulated in the *Draft Articles* include a duty to cooperate[57], the prior assessment of risk (such as conducting an EIA)[58], and notification[59] and consultation[60] with states that are likely to be affected. These procedural obligations comprise the basic standard of due diligence that states must meet to satisfy the general obligation to prevent significant transboundary harm.[61] Under this formulation, the relevant question for establishing breach of the no-harm rule is whether a state has complied with these procedural obligations, rather than whether an activity resulted in significant transboundary harm.[62]

6.2.3 Significance of the Draft Articles on Prevention

As mentioned above, the *Draft Articles on Prevention* provide a detailed interpretation of the no-harm rule. Until this point in time, the scope and standard of care for the no-harm rule was expressed in a piecemeal fashion across a number of sources. The ILC drew on the decisions of international courts and tribunals and multilateral agreements to provide a comprehensive account of the content of the no-harm rule.[63] In particular, the *Draft Articles* provide a clear

[51] Redgwell, above n 25, 16.
[52] *Draft Articles on Prevention*, above n 1, 154
[53] Ibid, 155.
[54] Ibid, 154
[55] Ibid.
[56] Ibid, 153-154. This is also set out under draft article 5.
[57] Ibid, art 4.
[58] Ibid, art 7.
[59] Ibid, art 8.
[60] Ibid, art 9.
[61] Ibid, 153.
[62] See Peel, above n 23, 67.
[63] See Birnie, Boyle and Redgwell, above n 25, 141.

account of the duty of due diligence and relevant procedural obligations flowing from that duty.[64] The accessible and clear treatment of the no-harm rule in the *Draft Articles* has influenced how states, jurists and international law scholars understand and interpret the no-harm rule.

Nevertheless, the *Draft Articles on Prevention* have shortcomings. First, as noted above, the *Draft Articles* do not distinguish between codification of existing customary international law and progressive development, meaning that some of the provisions contained within them may not accurately represent how states understand their obligations under the no-harm rule. Second, the *Draft Articles* do not clearly represent alternative interpretations of the no-harm rule, including suggestions that states have a duty of result or 'strict liability' for harm from ultra-hazardous activities.[65] Third, the *Draft Articles* do not clearly address activities that are inherently harmful. That is activities which, by their very nature, will result in transboundary harm, and for which the likelihood and/or severity of harm cannot be minimised through due diligence and procedural obligations.[66] As noted by Handl, the *Draft Articles* do not expressly acknowledge the possibility that, for inherently harmful activities, the only logical way to satisfy the duty of due diligence would be not to engage in the activity at all.[67] Finally, the *Draft Articles* do not address the prevention of harm to the global commons. In this sense, their scope is significantly narrower than the no-harm rule under customary international law. This also means that the no-harm rule, duty of care and procedural obligations contained in the *Draft Articles* were not formulated to address the global commons, and therefore might not readily translate to this issue.

Despite these shortcomings, over 15 years since their publication, the interpretation of the no-harm rule in the *Draft Articles on Prevention* has gained considerable traction, as demonstrated in the following three cases.

[64] Stephens, above n 19, 157-158.
[65] See, eg, L F E Goldie, 'Concepts of strict and absolute liability and the ranking of liability in terms of relative exposure to risk' (1985) 16 *Netherlands Yearbook of International Law* 175; John M. Kelson, 'State Responsibility and the Abnormally Dangerous Activity ' (1972) 13(2) *Harvard International Law Journal* 197; C Wilfred Jenks, *Liability for Ultra-Hazardous Activities in International Law* Recueil des Cours (Brill Nijhoff, 1966).
[66] See arguments made by Australia and New Zealand in the *Nuclear Tests* cases in chapter 5.3.
[67] Günther Handl, 'Transboundary Impacts' in Daniel Bodansky, Jutta Brunnée and Ellen Hey (eds), *The Oxford Handbook of International Environmental Law* (Oxford University Press, 2007) 531, 540.

6.3 2010: PULP MILLS ON THE RIVER URUGUAY (ARGENTINA V URUGUAY)

The *Pulp Mills on the River Uruguay*[68] *('Pulp Mills')* involved a dispute between Argentina and Uruguay darting back to 2003 concerning Uruguay's construction of two pulp mills along the River Uruguay, which forms a shared border with Argentina.[69] In 1975, Argentina and Uruguay entered into the *Statute of the River Uruguay,*[70] a treaty which established a regime for the shared use and management of the River, including the creation of an administrative commission comprised of representatives from both states (Commission for the River Uruguay).[71] Argentina claimed that that Uruguay had breached its substantive and procedural obligations under the *Statute of the River Uruguay* by authorising and beginning construction of the pulp mills.[72]

The judgment primarily focused on the interpretation and application of the *Statute of the River Uruguay.* A key question was whether Uruguay had breached the substantive obligation under article 41 of the *Statute of the River Uruguay* to prevent pollution and preserve the aquatic environment of the river by adopting appropriate rules and measures.[73] This included the obligation to conduct a 'full and objective' environmental impact assessment.[74] Although the obligation in question was contained in a treaty, its similarity to the no-harm rule led the court to also consider obligations under customary international law.[75]

6.3.1 The obligation to prevent transboundary pollution and conduct an environmental impact assessment

In interpreting Uruguay's obligation to prevent pollution under article 41 of the *Statute of the River Uruguay,* the majority of the Court briefly considered the no-harm rule under customary international law. It held that:

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[68] *Pulp Mills on the River Uruguay (Argentina v Uruguay)(judgment)* [2010] ICJ Rep 14 (*Pulp Mills*).
[69] For an overview of the factual background and political context of this dispute, see Allen L Springer, *Cases of Conflict: Transboundary Disputes and the Development of International Environmental Law* (University of Toronto Press, 2016) 198-206.
[70] *Statute of the River Uruguay*, Argentina-Uruguay, opened for signature 25 February 1975, 1295 UNTS 340 (entered into force 18 September 1976).
[71] The Court considered the role of the Commission for the River Uruguay at *Pulp Mills* [2010] ICJ Rep 14, [84]-[93].
[72] 'Memorial Argentina (translation)', *Pulp Mills on the River Uruguay (Argentina v Uruguay)*, International Court of Justice, General List No 135, 15 January 2007, 92-138.
[73] *Pulp Mills* [2010] ICJ Rep 14, 28.
[74] Ibid, 28
[75] See Donald K Anton, '*Case Concerning Pulp Mills on the River Uruguay (Argentina v Uruguay)* (Judgment) [2010] ICJ Rep (20 April 2010)' (2010) 17 *Australian International Law Journal* 213, 213.

> A State is thus obliged to use all the means at its disposal in order to avoid activities which take place in its territory, or in any area under its jurisdiction, causing significant damage to the environment of another State.[76]

The majority referred to the Court's earlier statement in the *Nuclear Weapons* advisory opinion— that the obligation to prevent transboundary harm and harm to the global commons is now a part of customary international law.[77] It further characterised the obligation of prevention as one of due diligence, that is:

> [a]n obligation which entails not only the adoption of appropriate rules and measures, but also a certain level of vigilance in their enforcement and the exercise of administrative control applicable to public and private operators, such as the monitoring of activities undertaken by such operators, to safeguard the rights of the other party.[78]

This interpretation of the duty of due diligence supports that of the ILC's *Draft Articles on Prevention.*[79]

The majority further held that the duty of due diligence had to be interpreted in light of recent developments in international law, including the practice of conducting an EIA.[80] The ICJ affirmed that states have a duty under customary international law to conduct an EIA when engaging in activities that risk having significant transboundary impacts.[81] In other words, states have a stand-alone obligation under customary international law to conduct an EIA. [82] However, the majority also confirmed that conducting an EIA is integral to the duty of due diligence, stating that:

> [D]ue diligence, and the duty of vigilance and prevention which it implies, would not be considered to have been exercised, if a party planning works liable to affect the régime of the river or the quality of its waters did not undertake an environmental impact assessment on the potential effects of such works.[83]

The duty to conduct an EIA is in line with principle 17 of the *Rio Declaration* and draft article 7 of the ILCs *Draft Articles on Prevention*. The judgment in the *Pulp Mills* case further suggests

[76] *Pulp Mills* [2010] ICJ Rep 14, [101].
[77] Ibid, 78. See also chapter 5.
[78] Ibid, [197].
[79] *Draft Articles on Prevention,* above n 1, art 3, art 5 (on the implementation of legislative and monitoring measures).
[80] *Pulp Mills* [2010] ICJ Rep 14, [204]. This reflects the Court's earlier position in the *Gabčíkovo-Nagymaros Project*. See chapter 5.5.
[81] *Pulp Mills* [2010] ICJ Rep 14, [204]; See also Anton, above n 75, 219; Springer, above n 69, 212.
[82] See Alan Boyle, 'Developments in the International Law of Environmental Impact Assessments and their Relation to the Espoo Convention' (2011) 20(3) *Review of European Community & International Environmental Law* 227, 227.
[83] *Pulp Mills* [2010] ICJ Rep 14, [204].

that, in certain circumstances, states may need to monitor and assess the impacts of an activity on an ongoing basis.[84]

The dispute required the Court to consider whether the content of an EIA is prescribed under customary international law. Argentina and Uruguay had both accepted that states have a duty to conduct an EIA under international law where an activity poses a risk of significant transboundary harm.[85] However, they disagreed as to the scope and content of the EIA necessary to comply with international law.[86] Although Uruguay had conducted an EIA prior to authorising the construction of the Pulp Mills, Argentina argued that it had been insufficient to satisfy Uruguay's obligation under international law. For example, it did not take into account *all* potential impacts from the Pulp Mills as required by international law.[87] Conversely, Uruguay claimed that international law (including the ILC's *Draft Articles on Prevention*) did not dictate the content and manner in which an EIA is to be conducted and that this was to be determined in accordance with national law.[88] The majority of the Court agreed with Uruguay. Unless a state is party to the 1991 *Convention on Environmental Impact Assessment in a Transboundary Context* (*'Espoo Convention'*)[89] (which neither party was in this case) the content of an EIA is to be determined by domestic legislation.[90] The judgment nevertheless suggests two exceptions. First, states ought to consider the 'nature and magnitude of the proposed development and its likely adverse impact on the environment' when determining the scope and content of an EIA.[91] Second, under customary international law, an EIA 'must be conducted prior to the implementation of a project.'[92] As such, the way in which an EIA is to be conducted is not *entirely* at the discretion of states.[93]

6.3.2 Significance of the Pulp Mills Case to the no-harm rule

The majority decision in the *Pulp Mills* case affirmed the standard of care of the no-harm rule under customary international law as one of due diligence. It also affirmed the obligation of

[84] *Pulp Mills* [2010] ICJ Rep 14, [205]
[85] Ibid, [203].
[86] Ibid.
[87] Ibid.
[88] Ibid.
[89] *Convention on Environmental Impact Assessment in a Transboundary Context*, opened for signature 25 February 1991, 1989 UNTS 309 (entered into force 10 September 1997) (*'Espoo'*). *Espoo* is a regional European convention. South American states are therefore not party to *Espoo*. See *Convention on Environmental Impact Assessment in a Transboundary Context* (6 May 2017) United Nations Treaty Collection < https://treaties.un.org/Pages/ViewDetails.aspx?src=TREATY&mtdsg_no=XXVII-4&chapter=27&lang=en>.
[90] *Pulp Mills* [2010] ICJ Rep 14, [205].
[91] Ibid.
[92] Ibid.
[93] Boyle, above n 6, 247.

states to conduct an EIA, and its relationship to the no-harm rule. However, leaving the content of an EIA to the discretion of individual states could be problematic. According to Anton, this creates the 'potential for inconsistency and varying levels of rigour' in EIAs.[94] It is unclear what states must do to satisfy this obligation in good faith. Overall, this decision suggests that, unless a state is party to the *Espoo Convention*, international law has a limited capacity to ensure that it conducts an EIA so as to *effectively* identify and manage risks of transboundary harm.

The Court's interpretation of the duty of due diligence, and the centrality of EIAs to this duty, supports the ILC's construction of the no-harm rule in its *Draft Articles*. The majority of the Court did not directly rely on the ILC's *Draft Articles on Prevention* to inform its judgment. However, Argentina and Uruguay both used the *Draft Articles* to inform their interpretation of their international legal obligations. In its memorial, Argentina cited the commentary to the Draft Articles to establish that EIAs are an important contribution to the prevention of transboundary harm.[95] Uruguay relied extensively on the *Draft Articles* to inform its interpretation of the obligation of due diligence under customary international law.[96] This suggests that, although the *Draft Articles* are not legally binding, some states nevertheless consider them to be highly authoritative interpretations of their international legal obligations.

6.4 2011: International Tribunal for the Law of the Sea's Advisory Opinion on the Responsibilities and Obligations of States Sponsoring Persons and Entities with Respect to Activities in the Area

The Responsibilities and obligations of States sponsoring persons and entities with respect to activities in the Area[97] ('Activities in the Area') is a 2011 advisory opinion of the Seabed Disputes Chamber of the International Tribunal for the Law of the Sea ('ITLOS'). 'The Area' is defined under article 1 of *UNCLOS* as 'the seabed and ocean floor and subsoil thereof, beyond the limits of national jurisdiction.' Article 136 declares the Area to be the 'common

[94] Anton, above n 75, 221.
[95] 'Memorial Argentina (translation)', *Pulp Mills on the River Uruguay (Argentina v Uruguay)*, International Court of Justice, General List No 135, 15 January 2007, 84.
[96] 'Counter-Memorial of Uruguay', *Pulp Mills on the River Uruguay (Argentina v Uruguay)*, International Court of Justice, General List No 135, 20 July 2007, [2.39]-[2.42].
[97] *Responsibilities and obligations of States with respect to activities in the Area (Advisory Opinion)* (International Tribunal for the Law of the Sea, Case No 17, 1 February 2011) ('*Activities in the Area*').

heritage of mankind'.[98] Any activities conducted in the Area must therefore benefit mankind as a whole.[99] The exploration of resources in the Area is therefore regulated under UNCLOS, and is subject to approval by the International Seabed Authority.[100] This advisory opinion therefore essentially focused on the rights and obligations of states concerning a global commons area. While it primarily concerned treaty obligations, the advisory opinion has also substantially contributed to the interpretation of customary international law.[101]

6.4.1 Background and the question before the ITLOS

The Seabed Disputes Chamber may, at the request of the UNCLOS Assembly or the Council of the International Seabed Authority ('the Council'), provide an advisory opinion on matters within the scope of their activities under article 191 of *UNCLOS*. The Pacific Small Island Developing State of Nauru petitioned the Council to request the advisory opinion.[102] In 2008, two state sponsored corporations from Nauru and Tonga applied to the International Seabed Authority to authorise a plan of work for exploration of the Area.[103] However, in 2009 the applicants postponed their applications.[104]

The reason for postponing the applications was the question of state liability for the activities of private companies in the area, including responsibility and liability for environmental damage. Nauru argued that developing states lacked the technical expertise and resources to undertake activities in the Area alone. Therefore, the only way developing states might participate in seabed mining would be to engage and/or sponsor private mining corporations to explore and/or exploit the Area. It was unclear whether a state could be held responsible for the activities of private companies in these circumstances. Nauru argued developing states could not afford to be held liable for the actions of private companies it might sponsor to

[98] Article 137 provides further details of the legal status of the Area. See also Donald K Anton, Robert A Makgill and Cymie R. Payne, 'Seabed mining - advisory opinion on responsibility and liability' (2011) 41(2) *Environmental Policy and Law* 60, 60.
[99] *UNCLOS* Article 140 (1).
[100] As per *Agreement relating to the implementation of Part XI of the United Nations Convention on the Law of the Sea of 10 December 1982*, opened for signature 28 July 1994, 1836 UNTS 3 (entered into force 28 July 1996), Annex I.
[101] See Duncan French, 'From the Depths: Rich Pickings of Principles of Sustainable Development and General International Law on the Ocean Floor – the Seabed Disputes Chamber's 2011 Advisory Opinion' (2011) 26 *The International Journal of Marine and Coastal Law* 525, 526-527.
[102] *Activities in the Area (Advisory Opinion)* (International Tribunal for the Law of the Sea, Case No 17, 1 February 2011) 17.
[103] As developing states, this request was pursuant to UNCLOS Annex III, Art 8. See Ibid, 16. See also Anton, Makgill and Payne, above n 98, 61.
[104] *Activities in the Area (Advisory Opinion)* (International Tribunal for the Law of the Sea, Case No 17, 1 February 2011) 16. See also Anton, Makgill and Payne, above n 98, 61.

conduct activities in the Area.[105] As such, the risk of such liability would entirely preclude developing states from being able to participate in deep seabed mining.[106] Nauru stated that an advisory opinion was needed 'so that developing States can assess whether it is within their capabilities to effectively mitigate such risks and in turn make an informed decision on whether or not to participate in activities in the Area.'[107]

The Council asked the Seabed Disputes Chamber to provide an advisory opinion on three specific questions:

> 1. What are the legal responsibilities and obligations of States Parties to the Convention with respect to the sponsorship of activities in the Area in accordance with the Convention, in particular Part XI, and the 1994 Agreement relating to the Implementation of Part XI of the United Nations Convention on the Law of the Sea of 10 December 1982?
> 2. What is the extent of liability of a State Party for any failure to comply with the provisions of the Convention, in particular Part XI, and the 1994 Agreement, by an entity whom it has sponsored under Article 153, paragraph 2 (b), of the Convention?
> 3. What are the necessary and appropriate measures that a sponsoring State must take in order to fulfil its responsibility under the Convention, in particular Article 139 and Annex III, and the 1994 Agreement?[108]

To address question 1, the Seabed Disputes Chamber examined key provisions of Part XI of *UNCLOS*. One of these provisions was Article 139(1), which provides:

> States Parties shall have the *responsibility to ensure* that activities in the Area, whether carried out by States Parties, or state enterprises or natural or juridical persons which possess the nationality of States Parties or are effectively controlled by them or their nationals, shall be carried out in conformity with this Part. The same responsibility applies to international organizations for activities in the Area carried out by such organizations.[109] (emphasis added)

The meaning of 'responsibility to ensure' was therefore key to determining the responsibility of sponsoring states. The Seabed Dispute Chamber characterised this as a due diligence obligation.[110] It held that:

> The sponsoring State's obligation "to ensure" is not an obligation to achieve, in each and every case, the result that the sponsored contractor complies with the aforementioned obligations. Rather, it is an obligation to deploy adequate means, to exercise best possible efforts, to do the utmost, to obtain this result. To utilize the terminology current in international law, this

[105] *Activities in the Area (Advisory Opinion)* (International Tribunal for the Law of the Sea, Case No 17, 1 February 2011) 16.
[106] Ibid, 16-17. See also, French, above n 101, 529.
[107] *Activities in the Area (Advisory Opinion)* (International Tribunal for the Law of the Sea, Case No 17, 1 February 2011), 17.
[108] Ibid, 15.
[109] See also ibid, [100]. The court also identifies as key provisions for the obligation of sponsoring states article 153(4) and annex III, article 4(4) (at [99]).
[110] *Activities in the Area (Advisory Opinion)* (International Tribunal for the Law of the Sea, Case No 17, 1 February 2011), [110].

> obligation may be characterized as an obligation "of conduct" and not "of result", and as an obligation of "due diligence". [111]

6.4.2 Obligation of due diligence and procedural obligations

While analysing the nature of the obligation under Part XI of UNCLOS, the Seabed Disputes Chamber also considered the meaning of due diligence under customary international law. It referred to the ICJ's judgment in the *Pulp Mills* case and confirmed that due diligence entails adopting and enforcing relevant rules at a domestic level.[112] Unlike the ICJ in the *Pulp Mills* case, the Seabed Disputes Chamber directly affirmed the ILC's interpretation of the duty of due diligence in article 3 of the *Draft Articles on Prevention*. That is, states do not have to absolutely prevent transboundary harm; they merely have to exert their best possible efforts to minimise the risk of harm eventuating.[113] In the context of liability of sponsoring states, this means that states are not 'liable for each and every violation committed by persons under its jurisdiction'.[114] The Chamber further suggested that the content of a duty of due diligence may change depending on the context of an activity, the risks involved and the development of new scientific or technical knowledge.[115] For example, the Chamber suggested that mining in the Area is riskier than mere exploration, entailing a higher standard of due diligence.[116] Therefore, as a general rule of thumb, the riskier an activity, the greater the standard of due diligence required from states.

The Seabed Disputes Chamber also considered the relationship between procedural obligations and the duty of due diligence. The Chamber held that states have a duty to apply a precautionary approach in order to limit the risk of serious or irreversible damage, as per *Rio* principle 15.[117] The Chamber held that 'the precautionary approach is also an integral part of the general obligation of due diligence of sponsoring States.'[118] It also suggested that the obligation to take

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[111] Ibid, [110].
[112] *Activities in the Area (Advisory Opinion)* (International Tribunal for the Law of the Sea, Case No 17, 1 February 2011), [115]. This obligation has recently been considered in greater detail by the Permanent Court of Arbitration in *The South China Sea Arbitration (Philippines v China) (Awards)* (Permanent Court of Arbitration, Case No 2013-19, 12 July 2016.
[113] *Activities in the Area (Advisory Opinion)* (International Tribunal for the Law of the Sea, Case No 17, 1 February 2011), [116] citing commentary to draft article 3 of the ILC *Draft Articles on Prevention,* above n 1. See also, French, above n 101, 539.
[114] Ibid, [112].
[115] Ibid, [117].
[116] Ibid.
[117] Ibid, [128].
[118] Ibid, [131].

a precautionary approach is a part of customary international law.[119] This suggests that states are not absolved of their duty to prevent significant transboundary harm under customary international law just because there is scientific uncertainty surrounding the likelihood and scope of negative impacts associated with a proposed activity.

The Seabed Dispute Chamber further considered the duty to conduct an EIA. Once again, it confirmed the decision of the majority judgment in the *Pulp Mills* case: that states have a direct obligation under customary international law duty to conduct an EIA and that this is also necessary to satisfy their obligation of due diligence to prevent harm.[120] The Chamber further affirmed that customary international law does not dictate the content of an EIA.[121] It also drew a connection between the duty to conduct an EIA and the duty to notify and consult, stating that 'in light of the customary rule mentioned by the ICJ, it may be considered that environmental impact assessments should be included in the system of consultations and prior notifications set out in article 142 of the Convention'.[122] However, the Chamber did not clarify this relationship under customary international law.

6.4.3 The significance of Activities in the Area

The advisory opinion on *Activities in the Area* builds on existing jurisprudence to strengthen an interpretation of no-harm rule that requires states exhibit a duty of conduct or due diligence. It affirms the approach taken by the majority of ICJ in the *Pulp Mills* case and directly affirms the ILC's *Draft Articles on Prevention.*[123] The Chamber used the *Draft Articles* to inform its interpretation of the duty of due diligence under Part XI of *UNCLOS* and customary international law. It essentially referred to the *Draft Articles* as if they were a binding source of international law.[124] This deference to the *Draft Articles* enhanced the perceived authority of the Chamber's interpretation of the no-harm rule. However, as demonstrated below in the discussion of the *Aerial Herbicide Spraying* case, this has not prevented some states from questioning the validity of the ILC's interpretation.

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[119] Ibid, [135].
[120] *Activities in the area (Advisory Opinion)* (International Tribunal for the Law of the Sea, Case No 17, 1 February 2011) [145]. See also French, above n 101, 541.
[121] Ibid, [148]-[149].
[122] Ibid, [148].
[123] French, above n 101, 539-540.
[124] See also Bordin, above n 17. Bordin suggests that reliance by the ICJ on various draft codification conventions produced by the ILC has become a more frequent occurrence in certain areas of international law, particularly the area of state responsibility.

6.5 2013: CASE CONCERNING AERIAL HERBICIDE SPRAYING (ECUADOR V COLOMBIA)

The *Aerial Herbicide Spraying* Case involved a dispute between Ecuador and Colombia.[125] Ecuador initiated proceedings against Colombia in the ICJ in 2008 regarding Colombia's aerial herbicide spraying program.[126] The program's purpose was to destroy illegal cocaine and poppy plantations in a region close to the border with Ecuador.[127] Ecuador alleged that the herbicides had drifted into its territory, causing significant transboundary harm. The no-harm rule was therefore central to this dispute.

The judgment of the ICJ in this case was eagerly anticipated by legal scholars. The ICJ had considered the no-harm rule in *obiter* in the *Gabčíkovo-Nagymaros Project* and the *Pulp Mills* case. However, the *Aerial Herbicide Spraying* case presented the Court with the opportunity to interpret and apply the no-harm rule as a principle of customary international law in a contentious case. The last time the no-harm rule under customary international law (as opposed to being contained in a treaty) had been applied in a contentious case was in the 1949 *Corfu Channel* case. According to Boyle, this was the ICJ's first opportunity to consider a dispute concerning transboundary air pollution.[128] It was also the first time such a dispute had come before any international court or tribunal since the *Trail Smelter* arbitration.[129] Sands and Peel noted that the *Aerial Herbicide Spraying* case presented the ICJ with 'an opportunity to revisit and clarify the issue of the level of environmental damage from atmospheric forms of pollution that is actionable under international law.'[130] The case also gave the ICJ an opportunity to consider the ILC's *Draft Articles on Prevention* and consider the accuracy of their interpretation of the no-harm rule.[131]

[125] *Aerial Herbicide Spraying (Ecuador v Colombia) (Order of 13 September 2013)* [2013] ICJ Rep 278 ('*Aerial Herbicide Spraying*').
[126] 'Application Instituting Proceedings', *Aerial Herbicide Spraying (Ecuador v Colombia),* International Court of Justice, General List No 138, 31 March 2008, 4.
[127] Ibid, 4.
[128] Boyle, above n 6, 235.
[129] Ibid.
[130] Philippe Sands and Jacqueline Peel, *Principles of International Environmental Law* (Cambridge University Press, 3rd ed, 2012), 242.
[131] Robert Esposito, 'The ICJ and the Future of Transboundary Harm Disputes: A Preliminary Analysis of the Case Concerning Aerial Herbicide Spraying (Ecuador v. Colombia)' (2010) 2(1) *Pace International Law Review Online Companion* 1, 31-32.

Unfortunately for legal scholars, these opportunities never came to pass. In 2013, the case was removed from the ICJ's List. [132] The Parties settled the dispute by way of a special agreement before oral hearings were heard or a judgment rendered. [133] The ICJ therefore did not have the opportunity to rule on the merits of the case or elaborate on the content of the no-harm rule.[134] However, the documents submitted in this case are nevertheless valuable. The written submissions of Ecuador and Colombia demonstrate how two states interpreted their obligations, and the obligations of other states, under the no-harm rule at this time.

Ecuador submitted that Colombia's aerial herbicide spraying program had caused significant transboundary harm within its territory. Ecuador claimed spraying had occurred 'near, at and across' its border, and had caused 'serious damage to people, to crops, to animals, and to the natural environment on the Ecuadorian side of the frontier'.[135] Ecuador also alleged that the spraying posed a 'grave risk of future damage over time.' [136] It therefore claimed that Colombia's aerial herbicide spraying program violated its rights under customary and conventional international law, and that Colombia had 'failed to meet its obligations of prevention and precaution.'[137] Ecuador initiated proceedings with a view to preventing further harm and for Colombia to indemnify it for the damage it had sustained.[138]

The submissions of both parties raise four key issues regarding the no-harm rule. First, what sources accurately reflect the content of the no-harm rule under customary international law? Second, what activities give rise to obligations under the no-harm rule? Third, what must states do to discharge the duty of due diligence to prevent transboundary harm? Fourth, what (if any) procedural obligations must states fulfil under the no-harm rule? These issues and the arguments of both Parties are considered further below.

6.5.1 The relevant sources of international law

Ecuador's claim that Colombia had breached its obligations under the no-harm rule relied heavily on the ILC's *Draft Articles* and various multilateral agreements. Ecuador acknowledged the contributions of the *Trail Smelter* arbitration, the *Stockholm Declaration,*

[132] *Aerial Herbicide Spraying (Order of 13 September 2013)* [2013] ICJ Rep 278.
[133] Ibid. See also Boyle, above n 6, 235.
[134] *Aerial Herbicide Spraying (Order of 13 September 2013)* [2013] ICJ Rep 278.
[135] 'Application Instituting Proceedings', *Case Concerning Aerial Herbicide Spraying (Ecuador v Colombia),* International Court of Justice, General List no 138, 31 March 2008, 4. For further details of the nature and extent of harm alleged see 10-13.
[136] Ibid, 4.
[137] Ibid, 26.
[138] Ibid, 4.

and *Rio Declaration* to the development of the no-harm rule.[139] However, it declared that the ILC's *Draft Articles* provided a more detailed formulation.[140] Ecuador also cited numerous multilateral environmental agreements to support its interpretation of the no-harm rule, including the *Convention on Long-Range Transboundary Air Pollution* (*'LRTAP'*), [141] *UNCLOS* and the *Espoo Convention.*

Colombia challenged Ecuador's use of these sources. It argued that the international agreements relied on by Ecuador did not accurately reflect Colombia's obligations under customary international law.[142] Ecuador and/or Colombia were not party to *LRTAP*, *UNCLOS* or the *Espoo Convention*. Colombia also pointed out that many of the agreements Ecuador referred to were regional agreements.[143] While they may create regional custom they did not hold sway over states in South America.[144] Colombia was therefore of the view that it was only bound by the general formulation of the no-harm rule as pronounced by the ICJ in the 1996 *Nuclear Weapons* advisory opinion.[145]

Colombia also disagreed with Ecuador's reliance on the ILCs interpretation of the no-harm rule in its *Draft Articles on Prevention.* It claimed that these were an exercise in progressive development and did not accurately reflect customary international law.[146] Colombia noted that few states had voiced their support for the *Draft Articles* as codifying existing customary law.[147] Colombia acknowledged that the no-harm rule provided states with an 'obligation of due diligence to prevent or minimize transboundary harm', but it highlighted that it (and a number of other states) did not accept every detail of the *Draft Articles* as reflecting customary international law.[148] For example, Colombia did not consider itself to be bound by draft article 7 to conduct an EIA.[149] Colombia proceeded to refute Ecuador's arguments based on the *Draft Articles*, but it pointed out that it nonetheless did not consider itself to be bound by them.[150]

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[139] 'Memorial of Ecuador Volume 1' *Arial Herbicide Spraying (Ecuador v Colombia)* International Court of Justice, General List No 138, 29 April 2009, [8.5]-[8.6].
[140] Ibid [8.6].
[141] *Convention on Long-range Transboundary Air Pollution*, opened for signature 13 November 1979, 1302 UNTA 217 (entered into force 16 March 1983) (*'LRTAP'*).
[142] 'Counter Memorial of the Republic of Colombia Volume I', *Arial Herbicide Spraying (Ecuador v Colombia)* International Court of Justice, General List No 138, 29 March 2010, [8.8], [8.68]-[8.70].
[143] Ibid, [8.7], [8.75].
[144] Ibid, [8.7].
[145] Ibid, [8.29].
[146] Ibid, [8.20].
[147] Ibid, [8.21], [8.23].
[148] Ibid, [8.23].
[149] Ibid [8.88]-[8.89]. Colombia's submission in its Counter-Memorial pre-dates the decision of the ICJ in the *Pulp Mills* case, which confirmed this duty to be part of customary international law.
[150] Ibid, [8.30].

These submissions suggest that states hold different views as to the content of the no-harm rule. In particular, Colombia's submissions suggest that not all states accepted the ILC's interpretation as authoritative as this time. Colombia's Counter-Memorial was submitted to the ICJ in 2010, before the Seabed Dispute Chamber's 2011 advisory opinion on *Activities in the Area*. It nevertheless raises questions regarding the Seabed Dispute Chamber's deference to the *Draft Articles* and challenges the inference they are an authoritative representation of customary international law.

6.5.2 The scope of the no-harm rule

Given Ecuador's reliance on the ILC's *Draft Articles on Prevention*, it is unsurprising that its interpretation of the scope of the no-harm rule reflects that of the ILC. Ecuador similarly interpreted the no-harm rule as applying to harm caused to 'persons, property or the environment.'[151] It referred to the same threshold level of 'significant harm', citing the ILC's definition.[152] It also adopted the ILC's 'spectrum' of risk of significant harm, in that the no-harm rule encompasses activities that have a low probability of disastrous harm and a high probability of significant harm.[153] Ecuador considered activities to give rise to obligations under the no-harm rule when they pose a foreseeable risk of harm.[154] Finally, Ecuador suggested that the burden of proof for establishing a risk of significant harm should be interpreted in light of the precautionary principle as expressed in principle 15 of the *Rio Declaration*. That is, '[a]n international tribunal must therefore take account of scientific uncertainty in determining whether harmful consequences are foreseeable or not.'[155]

As noted above, Colombia rejected Ecuador's arguments primarily on the basis that the ILC *Draft Articles* do not represent existing customary international law. It further argued that, even if it were bound by these articles, its activities did not satisfy the definition of risk of significant harm, in that the aerial herbicide spraying program did not carry a high probability of significant transboundary harm or a low probability of disastrous harm.[156] Colombia further

[151] 'Memorial of Ecuador Volume 1' *Arial Herbicide Spraying (Ecuador v Colombia)* International Court of Justice, General List No 138, 29 April 2009, [8.11].
[152] 'Memorial of Ecuador Volume 1' *Arial Herbicide Spraying (Ecuador v Colombia)* International Court of Justice, General List No 138, 29 April 2009 [8.14].
[153] Ibid, [8.18].
[154] Ibid, 282.
[155] 'Memorial of Ecuador Volume 1' *Arial Herbicide Spraying (Ecuador v Colombia)* International Court of Justice, General List No 138, 29 April 2009, [8.20].
[156] 'Counter Memorial of the Republic of Colombia Volume I', *Arial Herbicide Spraying (Ecuador v Colombia)* International Court of Justice, General List No 138, 29 March 2010, [8.28].

disagreed with Ecuador's invocation of the precautionary principle. In Colombia's opinion, the precautionary principle was not a binding norm of customary international law. It stated that

> The precautionary principle does not constitute as such an international obligation; it is usually formulated by international tribunals in adjectival terms, and as an "approach" rather than a "principle". It may be seen as providing guidance as to how States should conduct themselves in matters concerning sustainable development. *There is no reason to think that it modifies the substantive law as concerns transboundary harm.*[157] (emphasis added)

This is not consistent with the Seabed Disputes Chamber's understanding of the precautionary approach in *Activities in the Area*.[158] It raises the possibility that the Seabed Disputes Chamber's characterisation of the precautionary approach may only be relevant in the context of *UNCLOS*, and not to customary international law.

6.5.3 The duty of care under the no-harm rule

Ecuador characterised the duty of care under the no-harm rule as a 'duty of conduct' or 'due diligence' type obligation. Drawing on the ILC *Draft Articles* Ecuador argued that, given the aerial herbicide spraying program posed a foreseeable risk of significant transboundary harm, Colombia had a duty to take adequate precautionary measures to prevent and/or minimise such harm.[159] It claimed that Colombia had failed to satisfy this obligation.[160] According to Ecuador, the standard of due diligence expected of a state should be appropriate and proportional to the degree of risk of transboundary harm that an activity entails.[161] Ecuador characterised Colombia's spraying program as being 'inherently hazardous'.[162] In other words, environmental harm, harm to humans and harm to animals was fundamental to the nature of herbicides being used. It therefore argued that the only appropriate way in which Colombia could minimise the risk of transboundary harm was to 'eliminate all risk' of the herbicide drifting into its territory.[163] It suggested that Colombia ought to have established a buffer zone along the border with Ecuador within which aerial herbicide spraying was prohibited to prevent the herbicides from drifting into Ecuador's territory.[164] It also suggested that Colombia could have further reduced the risk of transboundary harm by using a less harmful herbicide.[165]

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[157] Ibid, [8.57].
[158] Above 6.4.2.
[159] 'Memorial of Ecuador Volume 1' *Arial Herbicide Spraying (Ecuador v Colombia)* International Court of Justice, General List No 138, 29 April 2009, [8.24], [8.26].
[160] Ibid, [8.24].
[161] Ibid, [8.26].
[162] Ibid, [8.27]-[8.28].
[163] Ibid, [8.27].
[164] Ibid, [8.30].
[165] Ibid, [8.30].

Finally, Ecuador alleged that Colombia ought to have notified Ecuador when spraying was taking place.[166] In Ecuador's view, Colombia had therefore 'manifestly failed to take all the appropriate precautionary measures within its power to prevent transboundary drift from causing significant harm in Ecuador.'[167]

Colombia agreed with the general proposition that the no-harm rule provided an obligation of conduct or due diligence.[168] However, Colombia denied that its aerial herbicide spraying program constituted an 'inherently hazardous' activity.[169] According to Colombia, the proposition that it must eliminate *all* risk sought to transform the duty of due diligence 'into a virtual guarantee' that harm would be absolutely prevented.[170] Such a high standard of care did not accord with the ICJ's formulation of the no-harm rule in the *Nuclear Weapons* advisory opinion. It noted that the ICJ had formulated the no-harm rule:

> [S]olely in terms of an obligation to ensure "respect" for the environment of other States, and the word was no doubt carefully chosen. It is clear that the Court did not intend to establish a standard in which all risk of harm was excluded.[171]

In other words, Colombia did not recognise a duty to *absolutely* eliminate risk of harm, no matter the nature of the activity in question.

The submissions of both parties demonstrate a common understanding that states have a due diligence obligation to prevent significant transboundary harm. However, what this standard of care entails in relation to specific activities appears to be unsettled. Given this is a contentious case, it is unsurprising that both states disagreed on this point. However, their submissions reveal a broader question: do inherently hazardous or harmful activities attract a different standard of care? The submissions of Ecuador indicate a higher standard of care. It may well be that the only way to prevent transboundary harm from some activities is not to engage in them at all. While Ecuador characterised the standard of care as one of due diligence, the proposition that a state must eliminate *all* risk from inherently hazardous activities more closely reflects a duty of result.[172]

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[166] Ibid, [8.33].
[167] Ibid, [8.36].
[168] 'Counter Memorial of the Republic of Colombia Volume I', *Arial Herbicide Spraying (Ecuador v Colombia)* International Court of Justice, General List No 138, 29 March 2010, [8.50].
[169] Ibid, [8.53], [8.55].
[170] Ibid, [8.53]-[8.55].
[171] Ibid, [8.56].
[172] See Birnie, Boyle and Redgwell, above n 25, 150.

6.5.4 Failure to adequately enforce domestic rules and regulations

The submissions by Ecuador and Colombia raise questions regarding the duty of states to establish and enforce relevant domestic laws as part of their duty of due diligence under the no-harm rule. In particular, what qualifies as adequate compliance and enforcement? In its Counter-Memorial, Colombia outlined the specific action it had taken at a domestic level to prevent significant transboundary harm. This included conducting the program in accordance with an Environmental Management Plan under domestic law; using modern equipment and technology; ongoing review of the chemical composition of the spray mixture; scientific review of the program; government and external audit; and the adoption of strict regulations for the spraying of the herbicide, such as height, speed, wind and droplet size rules.[173] Colombia therefore argued that it had satisfied its obligation of due diligence through domestic law regarding the aerial herbicide spraying program.[174]

However, Ecuador argued that Colombia had breached its obligation of due diligence as it had failed to comply and/or enforce relevant domestic law.[175] Ecuador claimed that the spraying flights routinely failed to comply with the prescribed height and speed regulations.[176] Ecuador further claimed that Colombia had failed to prevent spraying in buffer-zones and other protected areas under its own laws.[177] According to Ecuador, the pilots of the aircraft were inadequately trained and had routinely ignored the operational requirements to prevent the herbicide from drifting into Ecuador's territory.[178] Ecuador therefore argued that Colombia had breached its duty of due diligence by failing to enforce domestic law and regulations to prevent significant transboundary harm.[179]

Failure to comply with and enforce relevant domestic law could play a more prominent role in international environmental litigation in the future. According to Boyle:

> A failure to enforce the law is in many respects the simplest failure of due diligence. Other failings are less easy to prove and expert technical evidence may be required. Moreover, while

[173] 'Counter Memorial of the Republic of Colombia Volume I', *Arial Herbicide Spraying (Ecuador v Colombia)* International Court of Justice, General List No 138, 29 March 2010, [8.60].
[174] Ibid, [8.60]-[8.61].
[175] 'Reply of Ecuador Volume I', *Arial Herbicide Spraying (Ecuador v Colombia)* International Court of Justice, General List No 138, 31 January 2011, [2.72]-[2.154].
[176] Ibid, [2.87]-[2.108].
[177] Ibid, [2.162]-[2.182].
[178] Ibid, [2.123]-[2.133].
[179] Ibid, [6.56]. Colombia did not deny that it had a requirement to enact and enforce domestic law in order to satisfy due diligence. However, Colombia refuted allegations that the content of its domestic regulation had been inadequate and that enforcement had been insufficient. See 'Rejoinder of the Republic of Colombia' *Arial Herbicide Spraying (Ecuador v Colombia)* International Court of Justice, General List No 138, 1 February 2012, [4.66]-[4.77].

> governments do not normally advertise their failure to control transboundary risks by having no laws on the subject, it may be far from easy to challenge the adequacy of those laws, or the choice of technology which is alleged to have caused the risk.[180]

This was a key issue in the recent decision by the Permanent Court of Arbitration in the *South China Sea* Arbitration.[181] This was in the specific context of provisions under UNCLOS and not customary international law, but nonetheless highlights how the duty to enact and enforce domestic law could be used strategically by states to demonstrate a breach of due diligence in international litigation.

6.5.5 Significance of the dispute

No judgment was rendered in the *Aerial Herbicide Spraying* case. However, the arguments of Ecuador and Colombia provide evidence of state practice concerning the no-harm rule. More importantly, they indicate that the efforts of the ILC may not have led to a uniform understanding of the no-harm rule. Colombia's submissions offer a stark reminder to states and legal scholars that while the ILC *Draft Articles on Prevention* present a detailed and convenient interpretation of the no-harm rule, they are not in themselves legally binding. Key issues therefore remain open to considerable interpretation, including the understanding of 'significant' harm and the extent of the obligation of due diligence.

The timing of Ecuador and Colombia's submission of the Memorial and Counter-Memorial respectively makes it somewhat difficult to assess their significance. These documents were submitted shortly before the decisions in the *Pulp Mills* case and *Activities in the Area.* In the case of Colombia's Counter-Memorial it is questionable whether Colombia would have made similar arguments in light of the decisions in these cases. For example, would Colombia's arguments have been any different concerning the duty to conduct an EIA, the precautionary approach and the relative authority of the ILC *Draft Articles*? On the other hand, Ecuador and Colombia's interpretations of the no-harm rule were not influenced by the contemporaneous views of the ICJ and the ITLOS. This arguably enhances the significance of these sources. They provide evidence of how two states understood their international legal obligations under the no-harm rule free from the persuasive views of these bodies.

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[180] Boyle, above n 6, 242-243.

[181] *The South China Sea Arbitration (Philippines v China) (Awards)* (Permanent Court of Arbitration, Case No 2013-19, 12 July 2016) 319-398. This case involved provisions for the protection of the marine environment under *UNCLOS* art 192 and 194. These articles are more specific and detailed than customary international law. They are therefore *lex specialis*. With the exception of elaborating on the duty to enact and enforce relevant domestic law, it is unclear the extent to which this case contributes to the development of the no-harm rule as a principle of customary international law. For this reason this case is not considered in detail in this research.

6.6 2015: CERTAIN ACTIVITIES CARRIED OUT BY NICARAGUA IN THE BORDER AREA (COSTA RICA V NICARAGUA) & CONSTRUCTION OF A ROAD IN COSTA RICA ALONG THE SAN JUAN RIVER (NICARAGUA V COSTA RICA)

On the 16 December 2015, the ICJ handed down its judgment in *Certain Activities Carried Out by Nicaragua in the Border Area (Costa Rica v Nicaragua)* & *Construction of a Road In Costa Rica Along the San Juan River (Nicaragua v Costa Rica)* ('*Certain Activities*' case).[182] The judgment addressed two disputes concerning activities conducted by Costa Rica and Nicaragua in the vicinity of the San Juan River. The disputes were joined by Order of the Court in 2013.[183] The no-harm rule was at the centre of both disputes. The *Certain Activities* case presented the ICJ with a long-awaited opportunity to consider the content of the no-harm rule and apply it in a contentious case. In this respect, the *Certain Activities* case is a landmark decision.

The majority judgment clarifies several key issues concerning procedural obligations on states flowing from the no-harm rule, but adds little clarity over the standard of care under the no-harm rule. Unlike the ITLOS, the ICJ does not directly refer to or endorse the ILC's interpretation of the no-harm rule in the *Draft Articles on Prevention*. For these reasons, the ICJ's judgment in *Certain Activities* raises more questions concerning the no-harm rule than it answers. It gives the impression that the content of the no-harm rule is far from settled, and that there may be room for further development of this rule in the future.

6.6.1 Background of dispute in Certain Activities Carried Out by Nicaragua in the Border Area (Certain Activities dispute)

This dispute concerned the alleged incursion and occupation of Costa Rican territory by Nicaragua's military in an area near the mouth of the San Juan River. The San Juan River runs along the border between Nicaragua and Costa Rica towards the Caribbean Sea. In accordance with an international agreement negotiated by the Parties in 1858 (1858 *Treaty of Limits)*, the

[182] *Certain Activities Carried Out by Nicaragua in the Boarder Area (Costa Rica v Nicaragua) & Construction of a Road in Costa Rica Along the San Juan River (Nicaragua v Costa Rica) (Judgment)* (International Court of Justice, General List No 150 & 152, 16 December 2015) ('*Certain Activities'*).
[183] *Certain Activities Carried out by Nicaragua in the Border Area (Costa Rica v Nicaragua) (Order of 17 April 2013)* [2013] ICJ Rep 166; *Construction of a Road in Costa Rica Along the San Juan River (Nicaragua v Costa Rica) (Order of 17 April 2013)* [2013] ICJ Rep 184.

boundary between the two states runs along the bank on the Costa Rican side of the river.[184] This agreement gave Nicaragua dominion over the waters of the river, but granted Costa Rica the right to navigate the river for commercial purposes.[185] In spite of this agreement, the jurisdiction and sovereign rights of both parties had been subject to several disputes over the previous 150 years.[186]

Costa Rica claimed that on the 18 October 2010, Nicaragua began dredging the San Juan River and commenced construction of an artificial channel on the Costa Rican side of the river.[187] In its application to the Court, Costa Rica alleged that Nicaraguan soldiers had incurred into Costa Rica territory, felling trees and depositing sediment while constructing the channel.[188] It also claimed that Nicaragua established a camp which occupied approximately three square kilometres of Costa Rican territory.[189] Costa Rica therefore argued that Nicaragua had breached its sovereignty and right to territorial integrity.[190] Costa Rica also argued that Nicaragua had breached the prohibition against the threat or use of force, owing to the presence of Nicaragua's military in Costa Rican territory.[191] In its memorial to the Court, it characterised Nicaragua's actions as 'nothing less than an invasion of foreign territory and an attempt at annexation.'[192] Part of the judgment focuses on the issue of state sovereignty and will not be considered further as it does not relate to the development of the no-harm rule.[193]

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[184] *Treaty of Limits*, Costa Rica – Nicaragua, signed 15 April 1858 (entered into force 26 April 1858). See also *Award in regard to the validity of the Treaty of Limits between Costa Rica and Nicaragua of 15 July 1858 (Costa Rica v Nicaragua) (Awards)* (1888) XXVIII RIAA 189; *Certain Activities* (International Court of Justice, General List No 150 & 152, 16 December 2015), [59].
[185] *Certain Activities* (International Court of Justice, General List No 150 & 152, 16 December 2015), [59].
[186] See Ibid, [59]-[62].
[187] Ibid, [63].
[188] 'Application Instituting Proceedings', *Certain Activities Carried Out by Nicaragua in the Boarder Area (Costa Rica v Nicaragua)* (International Court of Justice, General List No 150, 18 November 2010) [4]
[189] Ibid, [4].
[190] *Certain Activities* (International Court of Justice, General List No 150 & 152, 16 December 2015), [65].
[191] 'Application Instituting Proceedings', *Certain Activities Carried Out by Nicaragua in the Boarder Area (Costa Rica v Nicaragua)* (International Court of Justice, General List No 150, 18 November 2010), 4.
[192] 'Memorial of Costa Rica Volume I' *Certain Activities Carried out by Nicaragua in the Border Area (Costa Rica v Nicaragua)*, General List no 150 (5 December 2011) [4.65].
[193] The majority of the Court found that Nicaragua's activities (excavating channels and establishing a military camp) had breached Costa Rica's territorial sovereignty. As Nicaragua was responsible for these breaches, Nicaragua was also obliged under the secondary rules of state responsibility to 'make reparation for the damage caused by its unlawful activity'. *Certain Activities* (International Court of Justice, General List No 150 & 152, 16 December 2015), [93]. Owing to this finding, this Court did not consider the application of international environmental law to Nicaragua's activities on Costa Rican territory, including the construction of the channels. Instead it confined its analysis of international environmental law to this question as to whether 'Nicaragua's dredging activities in the Lower San Juan carried a risk of significant transboundary harm.' (at [105]). The majority judgement also did not address issues concerning use of force. The majority considered that the relevant conduct of Nicaragua had already been addressed in relation to the breach of territorial sovereignty. While the Court did not rule out the possibility that Nicaragua's activities also constituted an unlawful use of

Costa Rica further alleged that Nicaragua had breached international environmental law by failing to fulfil procedural requirements to prevent transboundary harm and the substantive obligation not to cause harm to the territory of other states.[194] In its application to the Court, Costa Rica claimed that Nicaragua had caused 'serious damage' to the territory it had occupied and that the construction of the canal would 'seriously affect the flow of water to the Colorado River', which flows from the San Juan River.[195] Costa Rica also argued that further construction would cause additional damage to wetlands and wildlife in its territory.[196]

In its Counter-Memorial, Nicaragua defended the legality of its activities. First, Nicaragua argued that its dredging program of the San Juan River was consistent with its right to maintain the navigability of the river.[197] Second, Nicaragua suggested that the 1858 *Treaty of Limits* was *lex specialis* and that general principles of international law only applied insofar as they did not contradict the terms of this treaty.[198] Nicaragua was therefore of the view that the no-harm rule, the duty to consult and notify other states and the duty to conduct an EIA were secondary to the terms of the 1858 *Treaty of Limits*.[199] Third, Nicaragua stated that it had conducted an EIA in compliance with its own domestic laws and had made the findings publicly available, regardless of whether it was legally obliged to do so.[200] According to Nicaragua, the EIA demonstrated the dredging program did not pose a risk of significantly altering the flow of the Colorado River, nor was it likely to significantly affect Costa Rican territory.[201] Nicaragua therefore argued that it had not breached its obligation under customary international law as its activities did not pose a risk of significant transboundary harm.[202]

force, it held that as the unlawful nature of these activities had already been established there was no need to examine it any further (at [97]).
[194] Ibid, [100].
[195] 'Application Instituting Proceeding', *Certain Activities Carried Out by Nicaragua in the Boarder Area (Costa Rica v Nicaragua)* (International Court of Justice, General List No 150, 18 November 2010) [4].
[196] Ibid, [4].
[197] 'Counter-Memorial of Nicaragua Volume 1' *Certain Activities Carried Out by Nicaragua in the Boarder Area (Costa Rica v Nicaragua)* (International Court of Justice, General List No 152, 6 August 2012) [1.13]-[1.15].
[198] Ibid, [3.21]-[3.22].
[199] 'Counter-Memorial of Nicaragua Volume 1' *Certain Activities Carried Out by Nicaragua in the Boarder Area (Costa Rica v Nicaragua)* (International Court of Justice, General List No 152, 6 August 2012) [3.26].
[200] Ibid, [3.47].
[201] Ibid, [1.14].
[202] Ibid, [5.17].

6.6.2 Background of dispute in Construction of a Road in Costa Rica Along the San Juan River (Construction of a Road dispute)

This dispute concerned the construction of a road by Costa Rica within its own territory along the San Juan River. Costa Rica began construction of the road in December 2010.[203] Following commencement of construction, Costa Rica published a decree that declared a state of emergency in connection with Nicaragua's alleged incursion into its territory as outlined above, and claimed that the construction of the road was necessary to maintain national security.[204] Nicaragua objected to construction of the road. In its application to the Court, Nicaragua claimed that the project had already resulted in significant amounts of sediment being dumped into the San Juan River.[205] It further claimed that the felling of trees and removal of topsoil along the riverbank would lead to erosion, further increasing sedimentation of the river.[206] Nicaragua was concerned that an increase in sedimentation might affect the water quality of the river, marine life and biodiversity of the surrounding ecosystem.[207] In addition to having major ecological impacts, Nicaragua also claimed that the construction of the road might have subsequent social, cultural and economic impacts.[208] For example, it risked causing impacts to fishing, other hydrological resources and ecotourism in the region.[209]

In its memorial to the Court, Nicaragua claimed Costa Rica had breached its international environmental obligations. This included the 'obligation to use its territory in a manner that does not caused harm to its neighbour', its duty to assess the risk of transboundary harm by conducting an EIA, and the duty to consult and notify with potentially affected states.[210] Nicaragua further submitted that:

> Costa Rica exercised no diligence, due or otherwise, with respect to its Road project. It did not respect "the duty of vigilance and prevention which [due diligence] implies". Therefore, due diligence cannot "be considered to have been exercised, [since] a party planning works liable to affect the régime of the river or the quality of its waters did not undertake an environmental impact assessment on the potential effects of such works."[211]

[203] *Certain Activities* (International Court of Justice, General List No 150 & 152, 16 December 2015), [64].
[204] 'Application Instituting Proceedings', *Construction of a Road by Costa Rica Along the San Juan River (Nicaragua v Costa Rica)* (International Court of Justice, General List No 152 (22 December 2011) [22]-[25].
[205] Ibid, [6].
[206] Ibid.
[207] Ibid, [7]-[10].
[208] Ibid, [10].
[209] Ibid, 20.
[210] 'Memorial of Nicaragua Volume I' *Construction of a Road in Costa Rica Along the San Juan River (Nicaragua v Costa Rica)* General List No 152 (19 December 2012) [5.4].
[211] Ibid, [5.32].

In Nicaragua's view, Costa Rica had declared an emergency situation merely to circumvent domestic law and its international legal obligations.[212] It argued that '…Costa Rica has attempted to force the actual situation onto the Procrustean bed of its law's definition of "disaster" in order to justify a colossal and environmentally destructive project'.[213] Nicaragua submitted that such invocation of national law to justify an internationally wrongful act was a violation of article 27 of the *Vienna Convention on the Law of Treaties*[214] and customary international law.[215]

Costa Rica refuted these allegations. First, Costa Rica stood by its justification that, because of the Emergency Decree, it was exempt from conducting an EIA under its own domestic law.[216] Second, Costa Rica argued that the construction of the road did not pose a risk of significant transboundary harm. As such, the threshold for triggering the duty to conduct an EIA and to consult and notify with other states had not been met.[217] Finally, Costa Rica claimed that Nicaragua had not established that significant transboundary harm had been caused to the San Juan River, nor that there was a risk of this occurring in the future.[218] As such, it had not breached its obligations under international law.

6.6.3 Judgment of the International Court of Justice

Procedural obligations

A key issue in both disputes was whether both Parties had breached the procedural obligation to conduct an EIA. In considering Costa Rica's arguments in the *Certain Activities* dispute, the ICJ affirmed its pronouncement in the 2010 *Pulp Mills* case. That is, states are required under customary international law to conduct an EIA where there is a risk of significant transboundary harm and that this is necessary to discharge the duty of due diligence.[219] However, the ICJ went beyond its statement in the Pulp Mills case, holding that:

> [T]o fulfil its obligation to exercise due diligence in preventing significant transboundary environmental harm, a State must, before embarking on an activity having the potential adversely to affect the environment of another State, ascertain if there is a risk of significant

[212] Ibid, [26]-[26].
[213] Ibid, [5.19].
[214] *Vienna Convention on the Law of Treaties*, opened for signature 23 May 1969, 1155 UNTS 331 (entered into force 27 January 1980).
[215] 'Memorial of Nicaragua Volume I' *Construction of a Road in Costa Rica Along the San Juan River (Nicaragua v Costa Rica)* General List No 152 (19 December 2012) [5.24].
[216] 'Counter Memorial of Costa Rica Volume 1' *Construction of a Road in Costa Rica Along the San Juan River (Nicaragua v Costa Rica)* General List No 152 (19 December 2013) [5.15].
[217] Ibid, [5.10]-[5.12], [5.20].
[218] Ibid, [5.25], [5.41].
[219] *Certain Activities* (International Court of Justice, General List No 150 & 152, 16 December 2015), [104].

> transboundary harm, which would trigger the requirement to carry out an environmental impact assessment.[220]

In other words, states have an additional obligation to first ascertain whether an activity poses a risk of significant transboundary harm. The majority of the Court held that if the result of this initial assessment is affirmative, then a state must conduct an environmental impact assessment, the content of which should reflect the nature and magnitude of the activity in question.[221] In considering Nicaragua's claim in the *Construction of a Road* dispute, the majority further suggested that the obligation to ascertain risk could be satisfied by conducting a preliminary risk assessment for a proposed activity.[222]

The judgment further suggests that the obligation to notify and consult is similarly contingent on the outcome of an environmental impact assessment.[223] The Court held that:

> [I]f the environmental impact assessment confirms that there is a risk of significant transboundary harm, a State planning an activity that carries such a risk is required, in order to fulfil its obligation to exercise due diligence in preventing significant transboundary harm, to notify, and consult with, the potentially affected State in good faith, where that is necessary to determine the appropriate measures to prevent or mitigate that risk.[224]

A finding of risk of significant harm is therefore needed at each stage to give rise to the procedural obligation to conduct an EIA and notify and consult respectively.

The ICJ followed these stages when considering whether Nicaragua had breached its procedural obligations to prevent significant transboundary harm.[225] The majority noted that in 2006, Nicaragua had conducted a study of the impacts of the dredging program which concluded that it would not significantly impact on the flow of the Colorado River.[226] The majority did not provide further details, but stated that on the basis of the evidence before it, it was satisfied that the program did not 'give rise to a risk of significant transboundary harm, either with respect to the flow of the Colorado River or to Costa Rica's wetland.'[227] Consequently, Nicaragua was not obliged under customary international law to carry out an EIA.[228] Nor was it obliged to further notify and consult with Costa Rica.[229] As there was no

[220] Ibid.
[221] *Certain Activities* (International Court of Justice, General List No 150 & 152, 16 December 2015), [104].
[222] Ibid, [154].
[223] Ibid, [104].
[224] Ibid.
[225] Ibid, [105]
[226] Ibid.
[227] Ibid.
[228] Ibid.
[229] Ibid, [107].

risk of significant transboundary harm, the question as to whether the 1858 *Treaty of Limits* created *lex specialis* was also a moot point. The majority merely noted that:

> [T]he fact that the 1858 Treaty may contain limited obligations concerning notification or consultation in specific situations does not exclude any other procedural obligations with regard to transboundary harm which may exist in treaty or customary international law.[230]

The majority went into greater detail when considering whether Costa Rica had breached its procedural obligations in the *Construction of a Road* dispute. The majority considered 'the nature and magnitude of the project and the context in which it was to be carried out.'[231] The proximity of the road to the river was a relevant factor. The Court held that this increased the likelihood of sediment being discharged into the river.[232] The majority further held that the risk of increased sedimentation was exacerbated by the possibility of natural disasters, such as hurricanes, tropical cyclones and earthquakes.[233] The road also passed through *Ramsar*-protected wetlands, heightening the risk of significant harm because of the particular sensitivity of that environment.[234] The majority therefore concluded that the construction of a road by Costa Rica posed a risk of significant transboundary harm.[235] Consequently, Costa Rica had an obligation to conduct an environmental impact assessment of the road.[236]

The majority considered Costa Rica's claim that a state of emergency exempted it from conducting an EIA under domestic legislation. The majority acknowledged its pronouncement in the *Pulp Mills* case that 'it is for each State to determine in its domestic legislation or in the authorization process for the project, the specific content of the environmental impact assessment required in each case'.[237] However, the majority held that this does not give states licence to use domestic law to exempt themselves from their international obligation to carry out an EIA.[238] The majority further noted that Costa Rica had not sufficiently demonstrated that an emergency situation existed; there was no imminent threat of military confrontation in the area where the road was being constructed.[239] Construction of the road had commenced prior to the formal declaration of a state of emergency.[240] As there was no emergency situation,

[230] Ibid, [108].
[231] *Certain Activities* (International Court of Justice, General List No 150 & 152, 16 December 2015), [155].
[232] Ibid.
[233] Ibid.
[234] Ibid.
[235] Ibid, [156].
[236] Ibid.
[237] Ibid, [157].
[238] Ibid.
[239] Ibid, [158].
[240] Ibid.

the majority refrained from considering whether such a situation would exempt a state from carrying out an EIA.[241] This issue remains open for the Court to examine at a later date. The majority therefore concluded that Costa Rica had an obligation to carry out an environmental impact assessment prior to the commencement of construction of the road.

The Court then turned its attention to whether Costa Rica had complied with the obligation to conduct an EIA. Costa Rica had conducted several studies on the Road, but these studies were conducted *after* the project had been commenced.[242] The majority affirmed its pronouncement in the *Pulp Mills* case that states have a continuing obligation to carry out an EIA and monitor the effects of a project.[243] However, it asserted that 'the obligation to conduct an environmental impact assessment requires an *ex ante* evaluation of the risk of significant transboundary harm'.[244] That is, states must conduct an EIA *before* commencing a project. It therefore held that Costa Rica had not complied with its obligation under customary international law to conduct an EIA prior to commencing construction of the road.[245] As Costa Rica had not fulfilled this obligation, the majority of the Court did not further examine whether it had complied with its obligation to consult and notify with Nicaragua under customary international law.[246]

In his separate opinion, Judge *Ad Hoc* Dugard criticised the majority judgment for taking a more 'scrupulous' analysis in the *Construction of a Road* dispute compared to the *Certain Activities* dispute.[247] He argued that the majority did not follow the same approach in both disputes; if it had, it would also have found that Nicaragua's activities posed a significant risk to Costa Rica's wetlands.[248] According to Dugard, the majority should have taken into consideration Ramsar wetlands within Costa Rican territory as it had in the *Construction of a Road* dispute.[249] By the Court's own reasoning, the wetlands should have lowered the threshold level for 'significant' transboundary harm.[250] This is an important difference, but it appears to have been the result of a different approach to evidence, rather than a different formulation of

[241] Ibid, [159].
[242] *Certain Activities* (International Court of Justice, General List No 150 & 152, 16 December 2015), [160]-[161].
[243] Ibid, [161].
[244] Ibid.
[245] Ibid, [162].
[246] Ibid, [168].
[247] *Certain Activities* (International Court of Justice, General List No 150 & 152, 16 December 2015) (Judge Ad Hoc Dugard) [20]-[35].
[248] Ibid, [35].
[249] Ibid, [32].
[250] Ibid, [35].

the procedural duties flowing from the no-harm rule. The Court provided more detail of its assessment of relevant evidence in *Construction of a Road*, but its analysis in *Certain Activities* still followed the same logic. That is, it was underpinned by an assessment of whether there was a risk of significant transboundary harm.

Substantive obligation

The majority's assessment as to whether Nicaragua had breached its substantive obligation to prevent significant harm under customary international law was equally brief. The majority recalled the formulation in the *Pulp Mills* case, that:

> [U]nder customary international law, "[a] State is . . . obliged to use all the means at its disposal in order to avoid activities which take place in its territory, or in any area under its jurisdiction, causing significant damage to the environment of another State." [251]

The *Pulp Mills* case characterised this as an obligation of due diligence, and not a duty of result.[252] However, the majority's consideration of the substantive obligation to prevent harm is somewhat confused in *Certain Activities*. The majority clearly recognised an obligation of due diligence in the context of procedural obligations. However, it did not clearly express this duty of care with regard to the substantive obligation in the *Certain Activities* dispute. The majority merely held that Costa Rica had failed to establish that Nicaragua's dredging program caused harm to its territory.[253] As there was no significant transboundary harm, the majority concluded that Nicaragua had not 'breached its obligations by engaging in dredging activities in the Lower San Juan River.'[254] Although brief, the majority's focus on whether significant transboundary harm was caused is more in keeping with a duty of result, than a duty of conduct.

The Court's approach to the *Construction of a Road* dispute further muddies the waters regarding the relevant standard of care. The majority defined its approach as follows:

> [T]he Court will make its own determination of the facts, on the basis of the totality of the evidence presented to it, and it will then apply the relevant rules of international law to those facts which it has found to be established[255]

Specifically, the majority began its inquiry by first considering whether, on the basis of the evidence before it, Costa Rica's construction of a road had caused significant transboundary harm to Nicaragua. The Court *then* considered whether Nicaragua had breached its substantive

[251] Ibid, [118].
[252] Above 6.3.
[253] *Certain Activities* (International Court of Justice, General List No 150 & 152, 16 December 2015), [119].
[254] Ibid.
[255] Ibid, [176].

obligations under customary international law, including whether Costa Rica had breached its obligation 'not to cause' significant transboundary harm. In other words, the majority judged Costa Rica's compliance with the substantive obligations under the no-harm rule on the *outcome* of its activities, and not on whether it had acted with due diligence.

In order to determine whether Costa Rica's activities had caused harm to Nicaragua, the ICJ had to consider the issue of sediment. First, it assessed the extent to which construction of the road had increased the amount of sediment in the river. It concluded that 'the amount of sediment in the river due to the construction of the road represents at most 2 per cent of the river's total load'.[256] It then considered whether this sediment had caused significant harm. The majority noted that the river's sediment load is naturally high and that the volume of sediment from the construction of the road was therefore 'insignificant' by comparison.[257] Drawing on the understanding of 'significant' in the ILC *Draft Articles on Prevention*, Nicaragua had argued that provided the change in sediment load was measurable, this was sufficient to qualify as significant transboundary harm.[258] However, the majority dismissed this argument in the given circumstances. It held that:

> Sediment is naturally present in the river in large quantities, and Nicaragua has not shown that the river's sediment levels are such that additional sediment eroded from the road passes a sort of critical level in terms of its detrimental effects. Moreover, the Court finds that, contrary to Nicaragua's submissions, the present case does not concern a situation where sediment contributed by the road exceeds maximum allowable limits, which have not been determined for the San Juan River.[259]

An increase in sediment alone therefore did not constitute significant transboundary harm.[260] The majority further held that, given the high natural variability of the river's sediment load, the relative impact of sediment from construction of the road was low.[261] The increase in sediment therefore did not meet the threshold level of 'significant' transboundary harm.

The majority also considered whether the 2 per cent increase in sediment had consequently caused any other significant transboundary harm to the river's morphology, navigability, and to Nicaragua's dredging program. Nicaragua had argued that, as the river already carried a high sediment load, any further increase in sediment would hinder its dredging activities and increase the impact on surrounding wetlands.[262] The Court stated that it was uncertain as to

[256] *Certain Activities* (International Court of Justice, General List No 150 & 152, 16 December 2015), [186].
[257] Ibid, [189].
[258] Ibid, [190].
[259] Ibid, [192]
[260] Ibid.
[261] Ibid, [194].
[262] Ibid, [199].

whether the sediment from the road was responsible for these further impacts on the river.[263] There were other factors that might have caused this, independent of Costa Rica's activities.[264] In other words, the 'chain of causation' could not be established that linked the sediment from Costa Rica's road to the harm claimed by Nicaragua. Moreover, the Court was not convinced that a 2 per cent increase in sediment would significantly affect Nicaragua's dredging burden.[265] Nicaragua had not established this claim, nor had it established the claim that the river's morphology or ecosystem had been significantly altered.[266] Claims that the road had negatively affected communities living along the river were also unsubstantiated.[267] The Court therefore concluded that, as none of Nicaragua's claims of transboundary harm had been established, Costa Rica had not 'breached its substantive obligations under customary international law concerning transboundary harm.'[268] Once again, it is difficult to reconcile this approach with a duty of due diligence, as the majority's determination was purely based on whether harm *had* been caused.

6.6.4 Significance of the judgment

Procedural obligations

The *Certain Activities* case clarifies when states must fulfil procedural obligations flowing from the no-harm rule. It suggests that procedural obligations do not all arise at the same time, but instead flow progressively from each other. According to Brunnée, this aspect of the majority judgment may strengthen the capacity of the no-harm rule to prevent significant harm as it clarifies 'the circumstances in which the related procedural obligations are triggered.'[269] States must be proactive in ascertaining if an activity within their jurisdiction and control poses a risk of significant transboundary harm. Following a preliminary risk assessment, the obligation to conduct an EIA and to notify and consult will be triggered in succession if there is a risk of significant transboundary harm. The threshold level of harm therefore not only determines the scope of the substantive obligation under the no-harm rule, but also when states must fulfil procedural obligations.

[263] Ibid, [203]
[264] Ibid, [204].
[265] Ibid, [205].
[266] Ibid, [205]-[212].
[267] *Certain Activities* (International Court of Justice, General List No 150 & 152, 16 December 2015), [216].
[268] Ibid, [217].
[269] Jutta Brunnée, 'Procedure and Substance in International Environmental Law: Confused at a Higher Level? ' (2016) 5(6) *ESIL Reflections* 1, 2.

Despite the importance of the threshold level of 'significant' harm, this case does not clarify how this threshold is to be determined. As noted above, the majority held that Nicaragua's dredging program did not pose a risk of significant transboundary harm to Costa Rica and had not resulted in significant transboundary harm. However, it did not provide further details as to how it reached this conclusion. The judgment is more detailed concerning the *Construction of a Road* dispute. The majority's determination that there was a risk of significant transboundary harm was based on a number of factors, including the likelihood of natural disasters and the proximity of Ramsar-protected wetlands. However, as pointed out by Judge *Ad Hoc* Dugard in his separate opinion, the majority does not appear to have given equal consideration to these factors in both disputes.[270] The requirement to consider Ramsar-protected wetlands is listed under Appendix III to the *Espoo Convention*, but is not necessarily established as a criterion under customary international law. Furthermore, the majority does not follow or endorse the understanding of 'significant' harm set out in the ILC *Draft Articles on Prevention*. The determination of significant transboundary harm appears to be a complex decision based on a number of competing factors, but it is unclear precisely what these factors are and why the majority chose to rely on them in its decision making. Greater transparency concerning the Court's determination of relevant factors and the weighting that should be attributed to them in future cases might provide states with greater certainty concerning this threshold. This would also assist states to determine when a proposed activity is likely to give rise to procedural obligations under the no-harm rule.

Standard of care

The *Certain Activities* case raises a number of questions concerning the standard of care under the no-harm rule. The sources examined in this chapter demonstrate that, during the third phase of the no-harm rule's development, states, international jurists and legal scholars widely understood the relevant standard of care to be a duty of conduct.[271] Breach of the no-harm rule was therefore determined by whether a state had failed to 'apply the restraints on transboundary injurious activates that it may reasonably be expected to adopt' in the given circumstances, not whether harm had been caused.[272] As stated by Boyle:

[270] Above 6.6.3.
[271] See, eg, Jacqueline Peel, 'The Practice of Shared Responsibility in relation to Climate Change' (2015) 71 *SHARES Research Paper* 1, 20;
[272] Redgwell, above n 25, 16.

> A violation [of the obligation of conduct] is not established by showing actual pollution or risk of pollution. Proof of pollution or the risk of pollution establishes only that the State has a duty to act. It does not tell us that the State has failed in its duty to act.[273]

However, the way in which the majority of the Court considered breach of the substantive duty in *Certain Activities* suggests that the standard of care is not so clear cut.

Brunnée similarly suggests that the judgment in this case complicates the understanding of the due diligence standard of care.[274] Brunnée focuses on the relationship between procedural obligations and the substantive due diligence obligation to prevent harm. According to Brunnée, the judgment in *Certain Activities* calls into question whether failure to fulfil a procedural obligation is enough to establish breach of the substantive (due diligence) duty to prevent harm, in the absence of a finding of significant transboundary harm.[275] The ability to establish breach without proof of harm would have its advantages. It could help establish a wrongful act in circumstances where proof of harm, causation or attribution is difficult to establish.[276] As noted by Brunnée:

> Violations of procedural obligations are more easily established and, by holding states to their procedural duties, they can sometimes be prompted to correct harmful conduct, or at least to take more effective preventive measures going forward.[277]

The majority judgment appears to be at odds with academic opinion, which largely supports the view that proof of harm itself is not necessary to establish breach of the obligation of due diligence.[278]

However, the confusion in the *Certain Activities* case arguably runs deeper than the relationship between procedural and substantive obligations. It raises questions regarding the nature of the standard of care itself. If proof of harm is necessary to establish breach of the substantive obligation to prevent significant transboundary harm, this does not fit the traditional understanding of a duty of due diligence. Breach would be contingent on result, not on conduct. In considering the substantive obligations in these disputes, the majority did not consider the conduct of Costa Rica and Nicaragua – only whether significant harm had been caused. This approach more strongly reflects a 'duty of result' being strict or absolute responsibility for harm, rather than due diligence.

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[273] Boyle, above n 6, 237.
[274] Brunnée, above n 269, 1-2.
[275] Ibid, 2.
[276] Ibid, 6.
[277] Ibid, 6.
[278] Ibid, 6. Brunnée also notes that this issue was highlighted in the separate opinions of several judges in this case. Cf Benoît Mayer, 'The relevance of the no-harm principle to climate change law and politics ' (2016) 19 *Asia Pacific Journal of Environmental Law* 79, 85.

A minority of legal scholars suggests that states may have two obligations when it comes to transboundary pollution: an obligation 'not to cause' harm and an obligation to 'prevent' harm. For example, Sands and Peel suggest that the former obligation is an extension of the principle of good neighbourliness and was derived from the sovereign rights of states.[279] In contrast, the latter obligation, which is reflected in the ILC *Draft Articles,* is one of due diligence that 'seeks to minimise environmental damage as an objective in itself.'[280] Beyerlin and Marauhn suggest that the no-harm rule entails both a prohibitive obligation and a preventative obligation.[281] In other words, a duty of result and a duty of conduct. Saxler, Siegfried and Proelss hold a similar view.[282] They note that while most legal scholars only recognise a preventative obligation (i.e. due diligence), this does not necessarily mean that the prohibitive obligation, stemming from the *Trail Smelter* arbitration, has been 'completely absorbed by the principle of prevention'.[283] The majority judgement in the *Certain Activities* case can be interpreted as re-enlivening these suggestions.

However, the idea that states have two different obligations concerning transboundary pollution is not supported by state practice. As noted by Verheyen, state practice typically does not support strict or absolute responsibility for significant transboundary harm.[284] The exception to this are 'ultrahazardous' activities. There is no uniform definition of ultrahazardous activities under customary international law. However, this term appears to include activities where the 'risk of harm from an activity is transnational in character, major in degree, and cannot be eliminated by the exercise of reasonable care'.[285] Examples of such activities include nuclear power, space activities and weather modification.[286] There is some state practice in support of a more onerous standard of care for ultrahazardous activities, especially nuclear activities.[287] The dispute in *Certain Activities* did not involve an

[279] Sands and Peel, above n 129, 197, 201.
[280] Ibid, 201.
[281] Ulrich Beyerlin and Thilo Marauhn, *International Environmental Law* (Hart, 2011) 40-41.
[282] Barbara Saxler, Jule Siegfried and Alexander Proelss, 'International liability for transboundary damage arising from stratospheric aerosol injections' (2015) 7(1) *Law, Innovation and Technology* 112, 122.
[283] Ibid.
[284] Roda Verheyen, *Climate Change Damage and International Law: Prevention Duties and State Responsibility* (Koninklijke Brill NV, 2005) 152-153.
[285] John M. Kelson, 'State Responsibility and the Abnormally Dangerous Activity ' (1972) 13(2) *Harvard International Law Journal* 197, 217.
[286] L F E Goldie, 'Liability for Damage and the Progressive Development of International Law' (1965) 14(4) *The International and Comparative Law Quarterly* 1189, 1190.
[287] See, eg, Joni S. Charme, 'Transnational Injury and Ultra-hazardous Activity: An Emerging Norm of International Strict Liability' (1989) 4 *Georgetown University Law Center* 75; Jenks, above n 65; Kelson, above n 285; Goldie, above n 286.

ultrahazardous activity, so it is difficult to know what to make of this aspect of the majority judgment. The standard of care could therefore benefit from further clarification in future cases.

The interpretations of the ITLOS and ILC

The majority judgment in *Certain Activities* does not directly engage with or endorse the interpretation of the no-harm rule found in two key sources. The first source that is conspicuously absent is the *Activities in the Area* advisory opinion. Brunnée highlights that the majority did not engage with the *Activities in the Area* advisory opinion when considering procedural and substantive obligations to prevent transboundary harm.[288] She notes that the Court did not endorse the ITLOS's progressive approach to due diligence, which recognised a relationship between the no-harm rule and the precautionary approach. [289] According to Brunnée:

> The most significant dimension of this approach to prevention and precaution is the increased importance that it accords to procedural obligations, including in particular EIA obligations, and the lowering of thresholds that it entails for the triggering of these obligations.[290]

The fact that the majority did not engage with the advisory opinion suggests that it did not agree with the Seabed Dispute Chamber's interpretation, at least insofar as it applies to customary international law, as opposed to obligations under *UNCLOS*. It is possible that the understanding of the ICJ and the ITLOS concerning due diligence has fragmented.

The majority opinion also does not directly engage with the ILC's *Draft Articles on Prevention*. As demonstrated throughout this chapter, the ILCs *Draft Articles on Prevention* have significantly influenced the content and the interpretation of the no-harm rule over the past fifteen years. They have been relied upon by states in their submissions before the ICJ, cited by the ITLOS and declared by renowned legal scholars as an authoritative representation of customary international law. However, the majority judgment in *Certain Activities* does not cite or draw upon the *Draft Articles on Prevention* to inform its interpretation of the no-harm rule and subsequent procedural obligations. This is the case even where the approach of the ILC clearly supports that of the ICJ (i.e. a sequential approach to procedural obligations).[291]

[288] Brunnée, above n 269, 6.
[289] Ibid, 5-6.
[290] Ibid, 6.
[291] See ibid, 4.

Given the level of momentum and perceived authority that the *Draft Articles on Prevention* have gathered, their absence from this judgment is conspicuous.

In past judgments, the ICJ has not hesitated to refer to other ILC projects to support its interpretation of customary international law. The most obvious example is the ILC's 2001 *Draft Articles on Responsibility of States for Internationally Wrongful Acts* (*Draft Articles on State Responsibility*) that provide a non-binding interpretation of the secondary rules of state responsibility.[292] As with the *Draft Articles on Prevention*, the *Draft Articles on State Responsibility* contain provisions that seek to codify and progressively develop customary international law in this area.[293] However, as noted by Bordin, the ICJ has nonetheless applied the provisions of the *Articles on State Responsibility* in its judgments in contentious cases in a similar manner to binding treaty rules.[294] The form of the *Draft Articles on Prevention* therefore does not sufficiently explain why they were absent from the majority judgment in *Certain Activities*. That the majority did not use or endorse the *Draft Articles on Prevention* raises questions regarding the ILC's interpretation of the no-harm rule. It implies that the *Draft Articles on Prevention* may not be an accurate representation of existing customary international law. The primary significance of *Certain Activities* is, therefore, that it raises further significant questions concerning the content of the no-harm rule, rather than clearly developing it.

6.7 CONCLUSION

This chapter considered key sources from the third phase of the development of the no-harm rule. During this phase, a strong understanding developed amongst states, international jurists and international law scholars of the no-harm rule providing a duty of conduct or due diligence, and the important role of procedural obligations flowing from that duty. A strong understanding also developed that harm must be significant in order to give rise to obligations under the no-harm rule. However, precisely how this threshold is to be interpreted in different scenarios remains unclear. Furthermore, with the exception of the *Activities in the Area* advisory opinion,

[292] *Draft Articles on Responsibility of States for Internationally Wrongful Acts, with commentaries* (2001) II(2) *Yearbook of the International Law Commission*, 31. See also, Bordin, above n 17, 544.
[293] David D Caron, 'The ILC Articles on State Responsibility: The Paradoxical Relationship between Form and Authority' (2002) 96(4) *The American Journal of International Law* 857, 858.
[294] Bordin, above n 17, 544 and n , 54. Bordin draws attention to the judgment of the ICJ in *Application of the Convention on the Prevention and Punishment of the Crime of Genocide (Bosnia and Herzgovina v Serbia and Montenegro)* [2007] ICJ Rep 14, [31], [91] and the *Pulp Mills case* [2010] ICJ Rep 14, [273].

development of the no-harm rule during this phase was primarily in the context of transboundary harm, as opposed to harm to the global commons.

The recent decision of the ICJ in the *Certain Activities* case disrupts the otherwise linear development of the no-harm rule during this phase. In many respects, it raises significant further questions concerning the content of the no-harm rule, rather than developing it. Issues that appeared to be settled during the third phase, such as the standard care and role of procedural obligations, now appear less certain. This case may prompt legal scholars to reconsider earlier interpretations of the no-harm rule. The *Certain Activities* case therefore suggests that further development of the no-harm rule remains possible. Only time will tell whether this case in fact heralds the beginning of a fourth phase in the no-harm rule's development.

7 Application of the No-Harm Rule to SAI

7.1 INTRODUCTION

The previous three chapters analysed how the content of the no-harm rule has developed since the 1938/1941 *Trail Smelter* arbitration. Chapter six considered the third phase in the no-harm rule's development. During this phase, the no-harm rule was interpreted as providing states with a duty of conduct or due diligence to prevent significant transboundary harm and harm to the global commons. Procedural obligations are central to fulfilling this duty. The 2015 *Certain Activities* case has raised a number of questions concerning the precise nature of the relationship between the duty of due diligence and procedural obligations. It has also raised questions concerning the relevant standard of care under the no-harm rule, and the possibility that states have two duties concerning transboundary pollution – a duty of result not to cause significant harm, and a duty of conduct to take steps to prevent harm from being caused in the first place. Regardless of the accuracy of this interpretation, the *Certain Activities* case serves as a timely reminder that, as a principle of customary international law, the content of the no-harm rule is not set in stone, and may continue to develop into the future.

The purpose of this chapter is to understand how the no-harm rule might respond to future attempts at SRM. This chapter applies the understanding of the no-harm rule established over the past three chapters to proposed solar radiation management (SRM) geoengineering. As explained in chapter one, this research primarily focuses on stratospheric aerosol injection (SAI) proposals as they are the most likely to be field tested and/or deployed. This chapter asks whether proposed SAI activities are likely to fall within the scope of the no-harm rule and, if so, what states must do to fulfil their obligations under this rule.

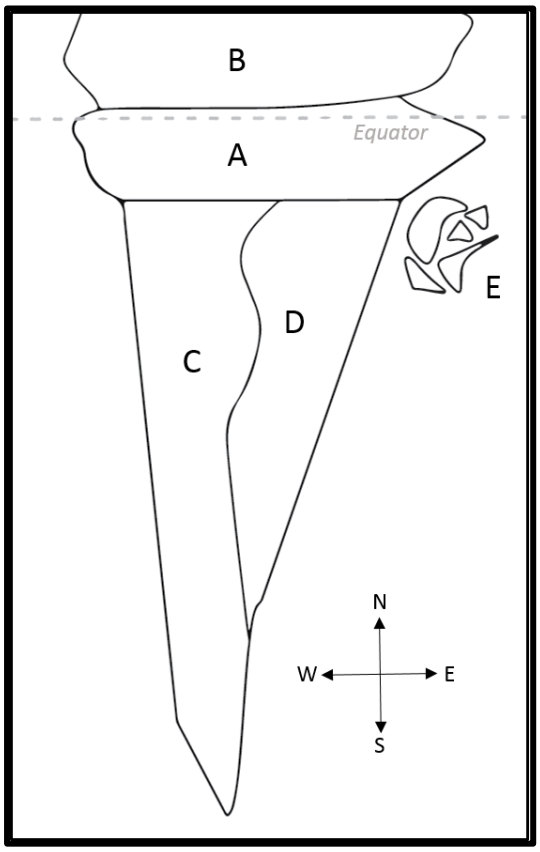
In order to give greater clarity and focus, this chapter bases its analysis on three hypothetical scenarios. They are used throughout this chapter to highlight potential issues concerning the application of the no-harm rule to future attempts at SAI. These scenarios are set out in section 7.2. Section 7.3 considers whether attempts at SAI would fall within the scope of the no-harm rule. Section 7.4 considers what states must do to fulfil their obligations under the no-harm rule if they engage in SAI activities. Section 7.5 concludes that no-harm rule has the potential to make an important contribution to future geoengineering governance. It provides considerable

guidance on what states must do should they decide to attempt SAI, but it needs to be further developed to enhance States' understanding of how it is to apply to the risks of SAI.

7.2 HYPOTHETICAL SAI SCENARIOS

This section outlines three hypothetical scenarios devised to illustrate how field testing and deployment of SAI might occur in the future. These scenarios are based on the potential side-effects and uncertainties of SAI raised in geoengineering literature and are intended to provide an illustrative empirical foundation for doctrinal analysis of the no-harm rule in the context of SAI. The states and scientists identified in these scenarios are fictitious and are not intended to represent the actual or anticipated actions or circumstances of any current state.

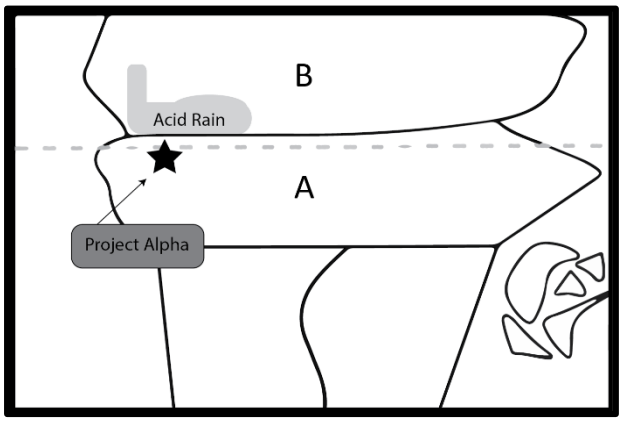
Figure 7.1 Scenario map



Scenario 1: Small scale field testing with transboundary impacts

Assume it is 2021, and in 2020 State A funded the development of SAI geoengineering by its National Scientific Research Organisation (NSRO). A research team employed by the NSRO developed a system that uses a modified weather balloon with a 15km-long hose attached to spray minute sulphur dioxide particles into the stratosphere from a government research facility

in the northwest of State A, at a location 200km south of the border with State B. This location was selected as it is close to the equator. This is the optimum latitude for SAI as the particles will remain in the stratosphere for longer than if released into the atmosphere at higher latitudes.[1] The system was designed so that the sulphur dioxide particles will react with oxygen in the atmosphere to form droplets of sulphuric acid, which will disburse to form a fine reflective layer in the stratosphere. [2]



The NSRO research team began testing the operation of this delivery system by spraying water vapour. Once the research team was satisfied with the mechanical operation of the delivery system, it commenced a series of 'small-scale' field tests that involved spraying the sulphur dioxide particles into the stratosphere.[3] This was known as Project *'Alpha'*: 500 kilotons of sulphur dioxide was sprayed into the stratosphere over a three month period. The goal of Project *Alpha* was to: study the reflective properties of the particles; learn how to produce particles that are the optimum size to reflect solar radiation and remain suspended in the stratosphere for an extended period of time; examine how particles interact with one another in the stratosphere; and assess the cost of operating the balloon-and-hose delivery system.[4] The amount of sulphur dioxide released into the atmosphere from Project *Alpha* was only 1/26th of what is produced annually by volcanic eruptions around the globe (i.e approximately 13,000 kilotons)[5]. It is also significantly less than the annual human emissions of sulphur into the troposphere (i.e. approximately 100,000 kilotons).[6]

[1] Alan Robock, 'Stratospheric Aerosol Geoengineering' in Roy Harrison and Ron Hester (eds), *Geoengineering of the Climate System* (The Royal Society of Chemistry, 2014) 162, 164. Robock also states that at this latitude, natural atmospheric circulation patterns would carry the particles towards the poles, causing them to spread.
[2] See ibid, 164.
[3] Solar Radiation Governance Initiative, *Solar radiation management: the governance of research* (2011) http://www.srmgi.org/report/ 47 ('*SRMGI Report*'). As noted in chapter 1, this project follows the distinctions set out in the *SRMGI Report*. The *SRMGI Report* categorises small-scale field tests as those in which SAI particles would be deployed into the atmosphere outside of a laboratory in order to gain more knowledge of the effects and risks of SAI, but not with a purpose of producing large-scale climatic effects.
[4] See David Keith, *A Case for Climate Engineering* (The MIT Press, 2013) 81-84.
[5] See Robock, above n 1, 165.
[6] Ibid. See also Keith, above n 4, 81-82. Keith proposes small-scale field tests that would 'use less than a hundred kilograms of aerosol material— less than one ten-millionth of what we would need to add every year to make a readily measurable impact on the climate.'

From Project *Alpha*, the NSRO research team learned how to create particles that are the optimum size to remain suspended in the stratosphere for up to 12 months and to effectively reflect solar radiation. The research team did not observe any negative impacts on the environment or the atmosphere from project *Alpha*, because the scale of the tests was too small to distinguish any impact SAI might have from other human causes and/or natural processes.

In the twelve months following Project *Alpha*, scientists in state B observed a slight episodic increase in the frequency and severity of acid rain in the southern areas of its territory, which are largely used for agricultural purposes or are designated as National Parks. Lakes and streams that are sensitive to 'episodic acidification' (a brief increase in pH levels from acid rain or snow[7]) are affected by this increase in acidity. There is no scientific evidence that any species of fish or other aquatic organisms have died as a result of the increase in acidity. However, scientists in State B have observed a decrease in the body-weight and size of some species of fish that are sensitive to an increase in acidity.

Scenario 2: Large-scale field testing with impacts on the ozone layer

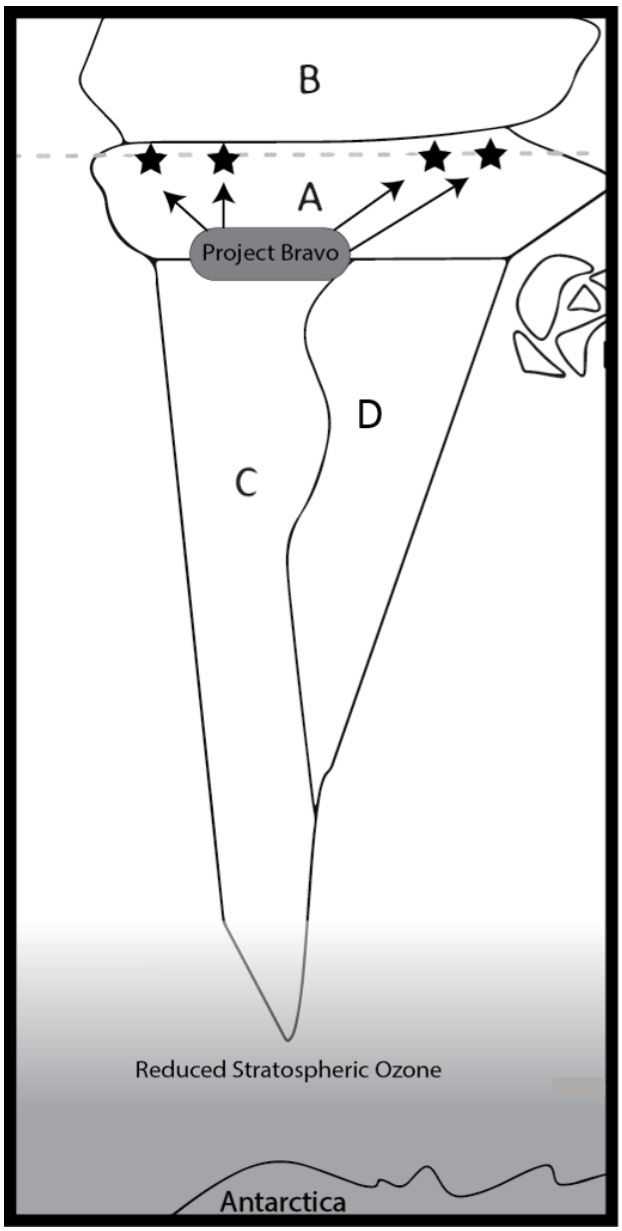
Assume it is 2023. In 2022, the Intergovernmental Panel on Climate Change (IPCC) released its Sixth Assessment Report. The report stated that global mean surface temperatures have increased at a faster rate than predicted in its 2014 Fifth Assessment Report. The IPCC indicated that it is 'extremely likely' that this has been caused by the increased level of greenhouse gas emissions from human activities, with global greenhouse gas levels having risen in 2022 to 415ppm. The report repeats the statement from the Fifth Assessment report:

> Continued emission of greenhouse gases will cause further warming and long-lasting changes in all components of the climate system, increasing the likelihood of severe, pervasive and irreversible impacts for people and ecosystems. Limiting climate change would require substantial and sustained reductions in greenhouse gas emissions which, together with adaptation, can limit climate change risks.[8]

The Sixth Assessment Report also concludes that the Intended Nationally Determined Contributions at 2015 Paris COP to the *UNFCCC* are not ambitious enough to curb further warming and decrease the likelihood of 'severe, pervasive and irreversible' climate change impacts. Those pledges put the earth on a path to a rise in mean surface temperature of 2.2-3.4

[7] See *Acid Rain*, US Environmental Protection Agency, <http://www3.epa.gov/acidrain/effects/surface_water.html>.
[8] Intergovernmental Panel on Climate Change, 'Summary for Policymakers' in *Climate Change 2014: Synthesis Report. Contribution of Working Groups I, II and III to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change* (IPCC, 2014) <http://www.ipcc.ch/report/ar5/syr/> 8.

˚C above pre-industrial levels, well above the 1.5 to 2.0 degrees contained in the text of the Paris Agreement.[9]



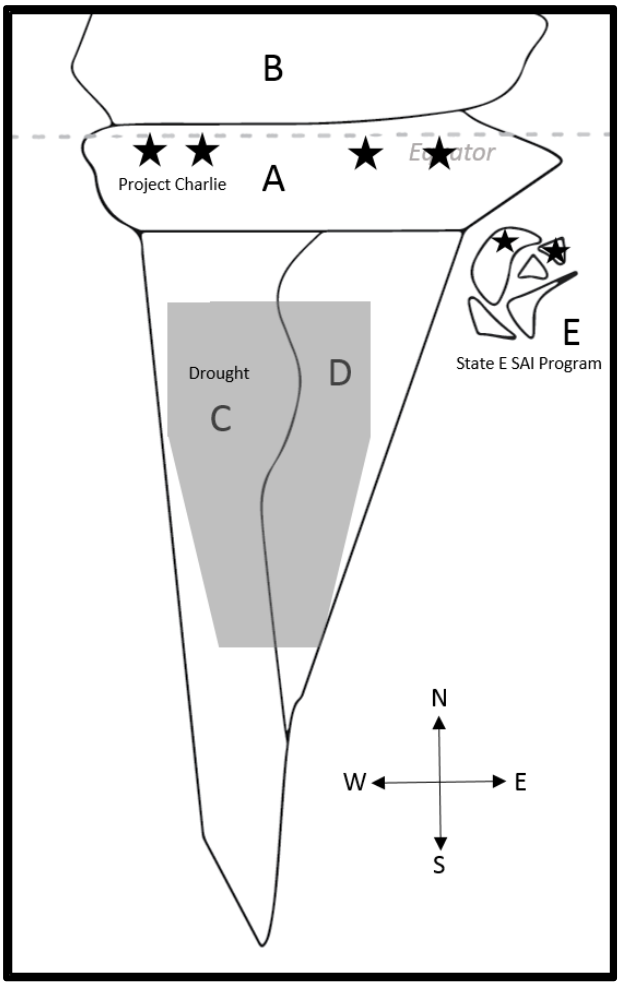
The government of State A therefore decides that it was important to learn more about the potential of SAI to quickly address the rising global mean surface temperatures associated with climate change. It funded the NSRO research team to conduct more SAI field tests on a larger scale than Project *Alpha*. The goal of this new project, ('Project *Bravo')* was to produce a measureable effect on local meteorological conditions. The research team field tested SAI on a continuous basis for twelve months. It slowly increased the amount of sulphur dioxide spraying into the atmosphere up to a total of 5,000 kilotons. The research team was confident that, at this concentration, they would be able to distinguish the impact of SAI on the local climate. [10] The NSRO research team monitored the impact SAI had on the climate at a local/regional scale and observed any undesirable side-effects.

At the end of Project *Bravo*, the NSRO research team observed a reduction in average surface temperatures of 0.2-0.5˚C across the northern regions of State A where the field tests were conducted. No significant side-effects were observed in the territories of State A or State B. However, in September 2023, the World Meteorological Organisation and the United Nations Environmental Program observed the

[9] *Paris Agreement*, opened for signature 12 December 2016 (entered into force 4 November 2016) < http://unfccc.int/paris_agreement/items/9485.php>.
[10] See Keith, above n 4, 84-86. Keith suggests that, if it is not possible to discern the cooling effect of an SAI experiment of a similar scale to this, it may be possible to detect other effects, such as 'changes in stratospheric temperature, the intensity and character of solar radiation, the surface energy balance of ice sheets and some ecosystem effects' (at 85).

largest reduction in stratospheric ozone concentration over Antarctica since 2006. State C has a border with State A to the South, and extends into the Southern Ocean. The Bureau of Meteorology in State C recorded significantly higher levels of UV radiation in the southern regions of its territory due to the reduction in stratospheric ozone concentration. The National Medical Council of State C stated that the increased level of UV radiation is likely to increase the incidence of skin cancer and cataracts of citizens living in these areas by 2-3% over the next 10 years.

Scenario 3: Full-scale deployment by two states with impacts on regional precipitation



Assume it is 2026.[11] In 2024, the government of State A funded a long-term SAI program called Project *Charlie*. The goal of Project *Charlie* was to spray 10,000 kilotons of sulphur dioxide per annum into the stratosphere on a continual basis to reduce global temperature by approximately 0.2˚C. The idea was to use SAI in conjunction with emission reduction and CDR geoengineering strategies to counteract a percentage of global warming from climate change, and extend time for the international community to reduce its greenhouse gas emissions to safer levels.[12] In the meantime, the NSRO research team continued to monitor for any adverse side-effects.

State E is an archipelago of small low-lying islands off the east-coast of States A and D. It is classified as a developing country according to the *World Economic Situation and*

[11] See ibid 88. According to Keith, the earliest SAI could feasibly be deployed on an ongoing basis would be around 2025.

[12] See, eg, Douglas G. MacMartin, Ken Caldeira and David W. Keith, 'Solar geoengineering to limit the rate of temperature change' (2014) 372(2031) *Phil. Trans. R. Soc. A* 1; Yu A Izrael et al, 'The ability of strospheric climate engineering in stabilizing global mean temperatures and an assessment of possible side effects', (2014) 15 *Atmospheric Science Letters* 140.

Prospects.[13] The average height above sea level of each island is 1.2 metres and the highest point in the archipelago is only 2.5 metres. In the summer months, State E is prone to cyclones. State E is threatened by rising sea levels and an increase in the severity of cyclones associated with climate change. The government of State E therefore followed the geoengineering efforts of State A with great interest. It was disappointed with State A's decision to only reduce global temperatures by 0.2 ˚C as this will not be enough to mitigate the more severe risks it faces from climate change.

Without coordinating with State A, State E initiated its own SAI program. The combined effect of both programs caused global mean surface temperatures to drop by 0.5˚C within twelve months. However, the international community is concerned about the long-term side effects of these programs. It is also concerned about the financial capacity of State E to continuously maintain its SAI program. If State E suddenly stops deployment of SAI, this could trigger the 'termination effect', causing global temperatures to rapidly rise and adversely impact on environmental and human systems.[14]

In the summer of 2025, following the SAI deployment by states A and E, precipitation patterns in the region were significantly altered.[15] The annual monsoon was considerably weaker than usual in States C and D, producing 70% less rainfall than the previous year. Both states were affected by severe drought.[16] By the summer of 2026, agricultural productivity in States C and D was halved and their dams fell to 15% capacity or less. Agriculture is the primary export industry of State D. The profit margins of associated companies and businesses were affected by the drought, and the economy of State D suffered a significant recession.

Use of the scenarios

Before continuing, it is important to clarify how these scenarios are used in this chapter to meet the aims of this project. Each scenario outlines a possible future SAI activity, how it is conducted and the effects it has on the climate, the atmosphere and/or the territory of other states. While each scenario follows through to the point where harm is caused, this is merely for illustrative purposes. It is not for the purpose of considering causation or secondary rules

[13] See *World Economic Situation and Prospectus- update as of mid-2016 (unedited advanced copy)* (United Nations, 2016).
[14] See chapter 1.2.2. See also Victor Brovkin et al, 'Geoengineering climate by stratospheric sulfur injections: Earth system vulnerability to technological failure' (2009) 92(3-4) *Climatic Change* 243.
[15] See Kevin E. Trenberth and Aiguo Dai, 'Effects of Mount Pinatubo volcanic eruption on the hydrological cycle as an analog of geoengineering' (2007) 34(15) *Geophysical Research Letters* L15702.
[16] See ibid.

of state responsibility for transboundary harm *after* it has been caused. This chapter, and the project as a whole, takes a forward-looking approach to the no-harm rule. As explained in chapters one, two and three, this project assesses the potential of the no-harm rule to contribute to the *ex-ante* governance of SAI. That is, to influence the behaviour of states so as to *prevent* significant transboundary harm and harm to the global commons. It is beyond the scope of this research to consider secondary rules of state responsibility. As the focus is on responding to risks of *future* harm, causation – establishing that the activity in question *caused* harm in a specific instance – is not important to this analysis.[17] The remainder of this chapter therefore asks two questions of the scenarios: (1) would the proposed SAI activity fall within the scope of the no-harm rule; and if so, (2) what should the states in question have done to fulfil their obligations under the no-harm rule to prevent significant transboundary harm and/or harm to the global commons?

7.3 WOULD SAI FALL WITHIN THE SCOPE OF THE NO-HARM RULE?

The previous three chapters demonstrated how the scope of the no-harm rule has developed over the past 70 years. It is clear from this analysis that activities which pose a *foreseeable* risk of significant transboundary harm and/or harm to the global commons will trigger obligations under the no-harm rule.[18] There is no clear 'test' for foreseeability in international law.[19] Verheyen suggests that in the context of the no-harm rule, foreseeability, at a basic level, requires *some* level of knowledge that a risk might materialise at *some* point in the future.[20] It is difficult to make this assessment on the basis of hypothetical scenarios. Moreover, foreseeability of risk is entwined with a state's procedural obligations under the no-harm rule. The decision of ICJ in the *Certain Activities* case suggests that states have a positive duty to ascertain whether an activity poses a risk of significant transboundary harm.[21] In assessing

[17] Causation and attribution would be key issues in establishing state responsibly and liability if a state should attempt SAI and caused transboundary harm. For a detailed discussion see David Reichwein et al, 'State Responsibility for Environmental Harm from Climate Engineering' (2015) 5(2-4) *Climate law* 142.
[18] See, eg, *Corfu Channel Case (United Kingdom v Albania) (Merits)* [1949] ICJ Rep 4, 22. See also Shinya Murase, 'Third report on the protection of the atmosphere', Protection of the Atmosphere, International Law Commission, 68th sess, UN Doc A/CN.4/692 (2 May-10 June and 4 July-12 August 2016), 9-10.
[19] Roda Verheyen, *Climate Change Damage and International Law: Prevention Duties and State Responsibility* (Koninklijke Brill NV, 2005) 182.
[20] Ibid.
[21] *Certain Activities Carried Out by Nicaragua in the Boarder Area (Costa Rica v Nicaragua) & Construction of a Road in Costa Rica Along the San Juan River (Nicaragua v Costa Rica) (Judgment)* (International Court of Justice, General List No 150 & 152, 16 December 2015) [104], [154] ('*Certain Activities*'). See also Shinya Murase, 'Third report on the protection of the atmosphere', Protection of the Atmosphere, International Law Commission, 68th sess, UN Doc A/CN.4/692 (2 May-10 June and 4 July-12 August 2016), 9-10.

whether an activity poses a foreseeable risk of harm, states might also be required to take a precautionary approach.[22] This issue is therefore further addressed alongside standard of care in section 7.4 below.[23]

The scope of the no-harm rule can otherwise be broken into three distinct elements.[24] In order for a proposed SAI activity to trigger the no-harm rule:

(1) It must pose a risk of having a transboundary effect beyond areas of sovereign jurisdiction or control of the source state (i.e. the state attempting the activity or within which the activity is to take place). This includes the territory of other states and global commons areas;
(2) In order to qualify as 'harm', the impact must flow from a physical act and be detrimental in nature; and
(3) Harm must meet the threshold level of 'significant'.

The following sections consider whether SAI proposals are likely to meet these elements.

7.3.1 Element 1: Transboundary impact

The no-harm rule does not respond to risks of harm solely *within* the territory of a source state.[25] In order for an activity to trigger the no-harm rule, it must pose a risk of having an impact beyond the jurisdiction of the source state. A proposed SAI activity would satisfy this element if it presented a risk of having an impact on the territory of another state. This reflects the original scope of the no-harm rule flowing from the *Trail Smelter* arbitration.[26]

SAI proposals risk having both direct and/or indirect impacts on the territory of other states. According to Craik, a direct impact from SAI on the territory of another state 'may occur if the released materials, deposited through a precipitate, have some harmful impact.'[27] Scenario 1 provides an example of a direct impact on the territory of state B – the sulphate particles created

[22] See *Responsibilities and Obligations of States Sponsoring Persons and Entities with Respect to Activities in the Area (Advisory Opinion)*, [2011] ITLOS Reports 10, [128] ('*Activities in the Area'*). See also Patricia Birnie, Alan Boyle and Catherine Redgwell, *International Law and the Environment* (Oxford Univerity Press, 3rd ed, 2009), 155. According to Birnie, Boyle and Redgwell, one interpretation of the precautionary approach is that states must be 'more cautious about identifying risks'.
[23] For the sake of this section, it is assumed that the harm in each of the hypothetical scenarios was reasonably foreseeable if the state in question had conducted a preliminary risk assessment and environmental impact assessment (EIA).
[24] Identification of these elements is inspired by the work of Xue Hanqin, *Transboundary Damage in International Law* (Cambridge University Press, 2003) 4-10.
[25] Reichwein et al, above n 17, 156.
[26] *Trail Smelter (United States v Canada) (Awards)* (1938 and1941) 3 RIAA 1905.
[27] Neil Craik, 'International Law and Geoengineering: Do Emerging Technologies Require Special Rules?' (2015) 5(2-4) *Climate Law* 111, 127.

by *Project Alpha* in State A contributed to acid rain, increasing the acidity of waterways in State B and effecting marine species. SAI could also product indirect impacts by triggering 'a physical change in atmospheric properties that can be shown to impact on another state's environment'.[28] The transboundary impacts in scenarios 2 (risk of harm to human health from ozone depletion) and 3 (drought from changes to regional precipitation patterns) fit this description.[29] Indeed, many of the potential side-effects of SAI identified in scientific literature on geoengineering are best described as indirect. Other examples include the potential effect of scattered sunlight on plant growth, and reduced availability of sunlight for solar power generation.[30]

This raises the question: are risks of indirect transboundary harm within the scope of the no-harm rule? It may be difficult to establish causation for indirect impacts from SAI *after* the fact.[31] Establishing factual causation would probably be challenging (i.e. establishing a link between SAI and ozone depletion, and further link between that amount of ozone depletion and an increase in incidences of skin cancer or eye cataracts).[32] Even if factual causation can be established, it may also be challenging to establish 'normative' causation— the harm caused may be considered too remote from an SAI activity to hold the source state liable.[33] However, there is nothing in the previous three chapters to suggest the *risks* of indirect transboundary harm from SAI will be beyond the scope of the no-harm rule. In this context, the issue is one of foreseeability of risk, as opposed to causation of harm. Therefore, so long as the risks of transboundary harm from SAI in the above scenarios is foreseeable, then this element would be satisfied, regardless of whether the harm is direct or indirect in nature.

A proposed SAI activity could also satisfy this element of the no-harm rule by posing a risk of having impacts on a global commons area. As mentioned in chapter five, the ICJ confirmed this extended scope of the no-harm rule in the 1996 *Nuclear Weapons* advisory opinion.[34] According to Brunnée, commons areas are 'located beyond the limits of national jurisdiction;

[28] Ibid, 127-128.
[29] See also ibid 127-128. Craik also categorises reduced sunlight from particles in the atmosphere as an indirect impact.
[30] See Alan Robock, '20 reasons why geoengineering may be a bad idea' (2008) 64(2) *Bulletin of the Atomic Scientists* 14, 16.
[31] See Reichwein et al, above n 17, 158-159. Reichwein et al note that tests for causation are not settled under international law and also vary between national jurisdictions. However, they suggest that international tribunals typically follow the distinction between factual and normative causation.
[32] Ibid, 159.
[33] Ibid.
[34] *Legality of the Threat or Use of Nuclear Weapons (Advisory Opinion)* [1996] ICJ Rep 226, [29] ('*Nuclear Weapons (Advisory Opinion)*').

they are not subject to appropriation by states.'[35] The high seas, the Antarctic land/ice mass and outer space are traditionally recognised as global commons areas.[36] Scientists recognise that SAI would do nothing to reduce high levels of CO_2 in the atmosphere.[37] SAI would do nothing to address climate change impacts such as ocean acidification, and may therefore lead to further degradation of the marine environment of the high seas.[38] However, a key concern raised in scientific literature is the potential for SAI to have detrimental side-effects on the atmosphere and global climate system. The scenarios in this chapter incorporate two of these concerns. Scenario 2 involves the risk of further depletion of the stratospheric ozone layer.[39] Scenario 3 involves the possibility that SAI could have a detrimental effect on regional climate and precipitation patterns.[40] Furthermore, regardless of potential negative side effects, SAI would be conducted *in* the atmosphere. It inherently involves *modification* of the atmosphere. It is therefore important to consider whether the element of transboundary effect would be satisfied by activities that modify and/or harm the atmosphere *per se*.

The international legal status of the atmosphere is uncertain. The atmosphere does not share the same physical characteristics as other traditionally recognised global commons areas such as the high seas, Antarctica and outer space. The Intergovernmental Panel on Climate Change defines that atmosphere as:

> The gaseous envelope surrounding the Earth. The dry atmosphere consists almost entirely of nitrogen (78.1% volume mixing ratio) and oxygen (20.9% volume mixing ratio), together with a number of trace gases, such as argon (0.93% volume mixing ratio), helium and radiatively active greenhouse gases such as carbon dioxide… and ozone. In addition, the atmosphere

[35] Jutta Brunnée, 'Common Areas, Common Heritage and Common Concern' in Daniel Bodansky, Jutta Brunnée and Ellen Hey (eds), *The Oxford Handbook of International Environmental Law* (Oxford University Press, 2007) 550, 557.
[36] See ibid, 558-561.
[37] See, eg, Philip J Rasch et al, 'An overview of geoengineering of climate using stratospheric sulphate aerosols' (2008) 366(1882) *Philosophical Transactions of the Royal Society A: Mathematical, Physical and Engineering Sciences* 4007, 4010; Robock, above n 30, 15.
[38] See, eg, Rasch et al, above n 37, 4010; Phillip Williamson and Carol Turley, 'Ocean acidification in a geoengineering context' (2012) 370(1974) *Philosophical Transactions of the Royal Society of London A: Mathematical, Physical and Engineering Sciences* 4317, 4318. Robock, above n 30, 15.
[39] For further consideration of this issue see The Royal Society, 'Geoengineering the climate: science, governance and uncertainty ' (The Royal Society 2009) ('*Royal Society Report*'), 31; S Schäfer et al, *The European Transdisciplinary Assessment of Climate Engineering (EuTRACE): Removing Greenhouse Gases from the Atmosphere and Reflecting Sunlight away from Earth* (2015) <http://www.eutrace.org/> 43-44 ('*EuTRACE Report*'); National Research Council, *Climate Intervention: Reflecting Sunlight to Cool the Earth* (The National Academies Press, 2015) <http://www.nap.edu/catalog/18988/climate-intervention-reflecting-sunlight-to-cool-earth> 86 ('*NRC SRM Report*').
[40] For further consideration of the potential impact of SAI on atmospheric circulation and the global hydrogen cycle see, eg, ibid, 31; *EuTRACE Report*, above n 39, 52; *NRC SRM Report*, above n 39, 83. The *NRC SRM Report* considers this impact in relation to regional use of SAI, as opposed to global use.

> contains the greenhouse gas water vapour, whose amounts are highly variable but typically around 1% volume mixing ratio. The atmosphere also contains clouds and aerosols.[41]

As a 'gaseous envelope surrounding the Earth', the atmosphere is not physically separated from the territory of states. It flows through the various territorial airspaces of states[42], thereby overlapping with the sovereign jurisdiction of states.[43] In this sense, harm to the atmosphere is not truly 'transboundary' in the same way as harm to the environment of the high seas or Antarctica, which are physically distinct from the territory of a source state.[44] For this reason, the atmosphere is not *res communis* ('common property') as this term only applies to areas that are physically distinct and not subject to state sovereignty.[45]

The concept of 'common heritage of humankind' is similarly ill-suited to define the legal status of the atmosphere. This term is applied under *UNCLOS* to the minerals of the deep seabed.[46] Writing on behalf of the ILC in its *First Report on the Protection of the Atmosphere*, Murase states that common heritage of mankind 'implies that a resource must be exploited and conserved for the benefit of mankind as a whole, such designation would usually require a far-reaching institutional apparatus to control the allocation of exploitation rights and benefits.'[47] This focus on exploitation and the division and allocation of exploitation rights is largely at odds with the need to protect the atmosphere and its nature as a fluid and indivisible global system.[48]

The legal status of the atmosphere is not clarified in international agreements concerning issues of atmospheric harm or pollution.[49] For example, the *Ozone Convention* defines the ozone

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[41] Intergovernmental Panel on Climate Change, 'Annex III: Glossary' in *Climate Change 2013: The Physical Science Basis. Contribution of Working Group I to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change* (Cambridge University Press, 2013) < http://www.ipcc.ch/pdf/assessment-report/ar5/wg1/WG1AR5_AnnexIII_FINAL.pdf>1448-1449.

[42] See Shinya Murase, 'First report on the protection of the atmosphere', Protection of the Atmosphere, International Law Commission, 66th sess, UN Doc A/CN.4/667 (5 May-6 June and 7 July-8 August 2014) 53.

[43] Birnie, Boyle and Redgwell, above n 22, 337-338. See also Marvin S. Soroos, *The Endangered Atmosphere: Preserving a Global Commons* (University of South Carolina Press 1997), 218. Under article 1 of the *Convention on International Civil Aviation*, opened for signature 7 December 1944 (entered into force 4 April 1947) ('*Chicago Convention')*, a state has 'complete and exclusive sovereignty over the airspace above its territory'.

[44] Reichwein et al, above n 17, 157.

[45] Shinya Murase, 'First report on the protection of the atmosphere', Protection of the Atmosphere, International Law Commission, 66th sess, UN Doc A/CN.4/667 (5 May-6 June and 7 July-8 August 2014) [86]; Birnie, Boyle and Redgwell, above n 22, 338.

[46] *United Nations Convention on the Law of the Sea*, opened for signature 10 December 1982, 1833 UNTS 3 (entered into force 16 November 1994) art 136 and 137 ('*UNCLOS'*).

[47] Shinya Murase, 'First report on the protection of the atmosphere', Protection of the Atmosphere, International Law Commission, 66th sess, UN Doc A/CN.4/667 (5 May-6 June and 7 July-8 August 2014) [87].

[48] See also Birnie, Boyle and Redgwell, above n 22, 338.

[49] Marvin S. Soroos, 'Preserving the Atmosphere as a Global Commons' (1998) 40(2) *Environment: Science and Policy for Sustainable Development* 6, 33. See also Prue Taylor, *An Ecological Approach to International Law: Responding to the challenges of climate change* (Routledge, 1998) 94-97.

layer, but not the atmosphere. The ozone layer is defined under Article 1(1) as 'the layer of atmospheric ozone above the planetary boundary layer.' According to Taylor, this definition automatically places the ozone layer beyond sovereign airspace at the threshold of outer space.[50] She states that the *Ozone Convention* therefore neatly avoided the problem of having to distinguish the atmosphere from sovereign airspace.[51] The preamble to the *UNFCCC* also does not clarify the legal status of the atmosphere. It acknowledges the issue of climate change to be a 'common concern of humankind'. According to Birnie, Boyle and Redgwell, the concept of common concern signifies that the issue of climate change is of international concern and transcends state borders.[52] However, the *UNFCCC* does not apply this concept to the atmosphere as a whole. Moreover, the precise legal implications of this concept are unclear.[53] That is, whether it provides states with any specific rights or obligations in relation to the atmosphere, or whether it clearly distinguishes the atmosphere from sovereign airspace.[54] Writing on behalf of the ILC in its *First Report on the Protection of the Atmosphere*, Murase nevertheless suggests the common heritage of humankind may evolve into an obligation *erga omnes* owed to the international community as a whole to protect the atmosphere.[55]

The above approaches provide little guidance on whether the atmosphere can be sufficiently distinguished from the territory of states in order to satisfy the element of transboundary effect. This research proposes that this issue can be clarified by focusing on the issue of control over the atmosphere, rather than physical separation between the atmosphere and sovereign territory. *Stockholm* principle 21 and *Rio* principle 2 reformulated the no-harm rule to include 'areas beyond the limits of national jurisdiction'. The ICJ in the *Nuclear Weapons* advisory opinion instead used the term 'areas beyond national control'.[56] Although the atmosphere flows

[50] Taylor, above n 49, 95.
[51] Ibid. But see Birnie, Boyle and Redgwell, above n 22, 338.
[52] Birnie, Boyle and Redgwell, above n 22, 338-339.
[53] See Brunnée, above n 35, 564-566; Shinya Murase, 'First report on the protection of the atmosphere', Protection of the Atmosphere, International Law Commission, 66th sess, UN Doc A/CN.4/667 (5 May-6 June and 7 July-8 August 2014) 57 [89]; Soroos, above n 43, 219.
[54] See Brunnée, above n 35, 564-566; Shinya Murase, 'First report on the protection of the atmosphere', Protection of the Atmosphere, International Law Commission, 66th sess, UN Doc A/CN.4/667 (5 May-6 June and 7 July-8 August 2014), 57 [89]; Soroos, above n 43, 219. The same argument can also be made concerning the new wording proposed by the ILC in its Draft Articles on the Protection of the Atmosphere. The ILC in its 2015 report suggests that 'the protection of the atmosphere from atmospheric pollution and atmospheric degradation is a pressing concern of the international community as a whole.' *Report of the International Law Commission on the Work of Its Sixty-Seventh Session (4 May – 5 June and 6 July – 7 August 2015)* UN GAOR, 70th sess, Supp No 10, UN Doc A/70/10, Chapter 5 [53]. This wording differs from that of common concern of humankind. It suggests that the atmosphere falls under a new category of 'pressing concern'. However, as with common concern, it is unclear what the legal implications of this third category might be.
[55] Shinya Murase, 'First report on the protection of the atmosphere', Protection of the Atmosphere, International Law Commission, 66th sess, UN Doc A/CN.4/667 (5 May-6 June and 7 July-8 August 2014) 57 [89].
[56] *Nuclear Weapons (Advisory Opinion)* [1996] ICJ Rep 226, 241-242.

through state airspace, it is nonetheless impossible for states to exercise individual sovereign control over the atmosphere.[57] A strong argument can therefore be made that the atmosphere is a global commons and that harm to the atmosphere *per se* is within the scope of the no-harm rule.[58]

This interpretation would have significant implications for the capacity of the no-harm rule to respond to future attempts at SAI. As mentioned above, SAI by its very nature involves modification of the atmosphere. Strictly speaking, any attempt at SAI, from small-scale field test to full scale deployment, would satisfy the element of transboundary effect by virtue of having an impact on the atmosphere. In other words, it may not be necessary to foresee a specific risk of *harm* to the atmosphere or risk of harm to the territory of other states in order for this element to be satisfied. For example, *Project Bravo* in scenario 2, may be considered to involve a transboundary effect simply by the fact that it was intended to change the atmosphere and climate system, albeit at a local scale. Furthermore, if the risk of ozone depletion was foreseeable, there would be little doubt that *Project Bravo* is going to have a transboundary effect. The SAI activities in all three scenarios would therefore easily satisfy this first element. However, in order to trigger obligations under the no-harm rule they must satisfy two further elements.

7.3.2 Element 2: Transboundary impacts must be harmful and flow from a physical act

As a general rule of customary international law, the scope of the no-harm rule is relatively broad, potentially accommodating a wide range of transboundary impacts. Key sources nevertheless suggest that there are two requirements that define the types of harm that fall within the scope of the no-harm rule. Transboundary impacts must stem from a physical act or activity and also qualify as 'harm' in the sense that they have a detrimental or negative consequence. Neither of these requirements are likely to be particularly contentious when considering whether a future attempt at SAI will fall within the scope of the no-harm rule.

[57] Soroos, above n 43, 220.
[58] See also Shinya Murase, 'Third report on the protection of the atmosphere', Protection of the Atmosphere, International Law Commission, 68th sess, UN Doc A/CN.4/692 (2 May-10 June and 4 July-12 August 2016), 17-19. Murase distinguishes between that atmosphere above other global commons areas, such as the high seas and Antarctica, and the atmosphere over the territory of states. He nevertheless suggests that states have a duty to prevent harm to the atmosphere in both instances.

However, in order to provide a clear and thorough analysis, this chapter considers these requirements in further detail below.[59]

In order to fall within the scope of the no-harm rule, the likely transboundary impacts of a proposed SAI activity must qualify as 'harm'. The analysis in chapters four, five and six suggests that 'harm' is loosely defined under customary international law. The only clear requirements for a transboundary impact to qualify as 'harm' under the no-harm rule is that it must stem from a physical act or activity and have a detrimental or negative consequence.

The need for an impact to stem from a physical act can be inferred from trends in international case law. The disputes in the cases examined in chapters four, five and six all involve harm or risks of harm from physical acts. This trend suggests that the no-harm rule may not respond to risks of transboundary harm from non-physical acts such as harm to another state as a result of state action involving 'the expropriation of foreign property, discriminatory trade practices or currency policies.'[60] The ILC endorsed this requirement in article 1 of the *Draft Articles on Prevention*, which states that '[t]he present articles apply to activities not prohibited by international law which involve a risk of causing significant transboundary harm through their *physical consequences*' (emphasis added).[61] This excludes transboundary harm caused by the monetary or socioeconomic policies of states.[62] Any impacts stemming from a future SAI activity would satisfy this requirement, as it is a physical activity. This requirement therefore would not prevent the risks of harm outlined in the above scenarios from falling within the scope of the no-harm rule.

However, the facts in scenario 3 pose an important and related question regarding the nature of harm: is non-physical harm within the scope of the no-harm rule if it is a consequence of a physical act?[63] Scenario 3 involves economic loss flowing from drought caused by reduced regional precipitation and/or altered monsoon patterns. This risk is not expressly noted in geoengineering literature, but the Royal Society report implies that drought caused by SAI

[59] See also Benoit Jacqmotte, 'Definition and Assessment of the Concept of Harm in a Regime of Transboundary Harm Prevention ' (1998) 3(2) *Austrian Review of International & European Law* 233, 241. Jacqmotte also suggests that it is important to provide an individual assessment of the meaning of harm.
[60] Hanqin, above n 24, 5.
[61] 'Draft Articles on Prevention of Transboundary Harm from Hazardous Activities, with Commentaries' (2001) II(2) *Yearbook of the International Law Commission*, 149 ('*Draft Articles on Prevention*').
[62] Ibid, 151.
[63] This is similar to the category of 'consequential' economic loss under domestic tort law. That is economic loss to a party that occurs as a result of physical damage. This is distinct from so-called 'pure economic loss' where economic loss results without any physical harm having been caused to a party. See Amanda Stickley, *Australian Tort Law* (LexisNexis Butterworths, 3rd ed, 2013) 200-201.

could subsequently have significant socio-economic impacts.[64] This chapter therefore considers if the example of consequential economic loss falls within the scope of the no-harm rule.

The issue of economic loss was raised in the *Trail Smelter* arbitration. The United States claimed that damage caused by the fumes emitted from the Trail Smelter had reduced the 'economic status' of residents living in affected areas and as a result, 'business men unquestionably suffered loss of business and impairment of the value of good will'.[65] The Tribunal in the *Trail Smelter* arbitration held that the claimed consequential economic harm to businesses in that case was 'too indirect, remote and uncertain'.[66] However, the Tribunal did not disqualify economic loss from being recoverable under the no-harm rule. The Tribunal merely suggested that it was too remote in the case before it.

Economic loss in the form of harm to industry was raised in the *Fukuryu Maru* incident. In 1954, the United States conducted a thermonuclear test on Bikini Atoll in the Pacific. A Japanese tuna fishing boat in the region was exposed to radioactive fallout from the test. As a result, the ship's crew was injured, and the ship and its catch were contaminated.[67] This specific incident was part of a larger problem— the United States nuclear testing program on Bikini Atoll contaminated the catch of a number of other ships operating in the region and had a significant impact on the Japanese fishing industry.[68] According to Margolis, significant numbers of fish had to be destroyed during 1954 due to radioactive contamination, and '[w]hat was not destroyed, people were afraid to eat.'[69] This had a detrimental impact on the Japanese fishing industry, which was very important to Japan's economy at that time.[70] The United States settled Japan's claim with an *ex gratia* payment of two million dollars.[71] Japan's claim was therefore not the subject of international litigation. Nonetheless, in a telegram to the US Department of State, the US Ambassador to Japan advised that:

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[64] *Royal Society Report*, above n 39, 31. For example, the report suggests that reduced precipitation in regions could impact on food security, and have regional effects similar to those associated with climate change.
[65] *Trail Smelter* (1938 and 1941) 3 RIAA 1905, 1931
[66] Ibid, 1931.
[67] See Emanuel Margolis, 'The Hydrogen Bomb Experiments and International Law' (1955) 64(5) *The Yale Law Journal* 629, 637.
[68] Ibid, 638.
[69] Ibid.
[70] Ibid.
[71] Memorandum by the Assistant Secretary of State for Far Eastern Affairs (Robertson) to the Under Secretary of State (Hoover), 29 December 1954, Office of the Historian, <https://history.state.gov/historicaldocuments/frus1952-54v14p2/d844>. See also ibid, 639.

> Formula of a single lump-sum would obviate litigiousness of interim claim as now formulated and *would avoid precedent for indirect damages to fishing industry* which might establish basis for extensive and continuing liability in Japan and elsewhere.[72] (emphasis added)

This statement indicates that the United States considered harm to industry to be potentially actionable under customary international law, as it wished to avoid any act on its behalf that might lead to more claims for such harm in the future.

The *Trail Smelter* arbitration and the *Fukuryu Maru* incident both involved liability for harm after the fact. They suggest that states may be held liable for economic harm, so long as it flows from a physical impact and is not too remote a consequence of an activity. Since these disputes, the no-harm rule has evolved to provide states with a positive duty of prevention.[73] By extension, it can be argued that states similarly have a duty to prevent such consequential impacts. When considering if a proposed SAI experiment falls within the scope of the no-harm rule, it might therefore be prudent for states to also consider any social or economic consequences that might result from their proposal. This may also be important for assessing the likely severity of harm, which is discussed further below.

In order for an activity to fall within the scope of the no-harm rule, the likely consequences of the activity must qualify as 'harm'. 'Harm' is not explicitly defined under customary international law.[74] However, the language of the no-harm rule as expressed by the *Trail Smelter* arbitration (which refers to 'injury') and *Stockholm* principle 21/*Rio* principle 2 (which refer to 'damage') implies that there must be some kind of adverse or detrimental consequence. In other words, mere change to the environment of another state or the global commons may not be sufficient to qualify as 'harm' and give rise to obligations under the no-harm rule. This was implied in the decision in the *Lake Lanoux* arbitration, in which the Tribunal did not consider diversion and restitution of the waters of the River Carol by France to have violated Spain's rights.[75] This understanding is further supported by international agreements, which require an activity to have 'adverse' 'destructive' or 'deleterious' effects.[76]

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[72] Telegram from The Ambassador of Japan (Allison) to the Department of State, 6pm 15 April 1954, Office of the Historian, <https://history.state.gov/historicaldocuments/frus1952-54v14p2/d757>.
[73] See chapters 5 and 6.
[74] See Jacqmotte, above n 59. Jacqmottee states that the meaning of harm varies between the different context of disputes and different international agreements. However, he notes that at the most basic level, harm involves detriment or loss (at 239).
[75] See chapter 4.4.2.
[76] See, eg, *Vienna Convention for the Protection of the Ozone Layer*, opened for signature 22 March 1985, 1513 UNTS 293 (entered into force 22 September 1988) art 2(1); *Convention on the Prohibition of Military or Other Hostile Use of Environmental Modification Techniques*, opened for signature 10 December 1976, 1108 UNTS 151 (entered into force 5 October 1978) art 1; *Convention on Long-range Transboundary Air Pollution*, opened for signature 13 November 1979, 1302 UNTA 217 (entered into force 16 March 1983) art 1.

It is therefore necessary to consider whether the potential transboundary impacts from future attempts at SAI would qualify as 'harm'. Certain potential impacts from SAI speak for themselves in this sense. For example, common sense dictates that negative impacts to human health[77], property[78] or agriculture[79] from SAI would qualify as harm. The risk of harm to human health in scenario 2 would undoubtedly meet this requirement. The reduction in agricultural productivity in scenario 3 would therefore also be likely to meet this requirement. However, it is not readily apparent whether other potential impacts from SAI such as the episodic increase in the acidification of waterways in scenario 1 and depletion of the stratospheric ozone layer in scenario 2, would meet this requirement. When would these impacts be considered 'harm' as opposed to mere change to the environment?

Existing international agreements provide some guidance as to when environmental impacts might be be considered harmful. Existing agreements define synonymous terms such as 'adverse impacts' and 'pollution'. For example, article 1 of the *Ozone Convention* defines 'adverse effects' as:

> [C]hanges in the physical environment or biota, including changes in climate, which have significant deleterious effects on human health or on the composition, resilience and productivity of natural and managed ecosystems, or on materials useful to mankind.[80]

Similarly, the *LRTAP* convention defines 'air pollution' under article 1(a) as:

> [I]ntroduction by man, directly or indirectly, of substances or energy into the air resulting in deleterious effects of such a nature as to endanger human health, harm living resources and ecosystems and material property and impair or interfere with amenities and other legitimate uses of the environment[81]

[77] For example, *Corfu Channel Case (United Kingdom v Albania) (Merits)* [1949] ICJ Rep 4. See also, 'Memorial of Ecuador Volume 1' *Arial Herbicide Spraying (Ecuador v Colombia)* International Court of Justice, General List No 138, 29 April 2009, 1.10. Ecuador claimed that the immediate effects of the herbicide on citizens included 'fever, eye and skin irritation, nausea, vomiting and diarrhoea' (at [1.18)).
[78] For example, damage to ships in *Corfu Channel* [1949] ICJ Rep 4.
[79] *Trail Smelter* (1938 and 1941) 3 RIAA 1905, 1924 (reduced crop yield); 'Memorial of Ecuador Volume 1' *Arial Herbicide Spraying (Ecuador v Colombia)* International Court of Justice, General List No 138, 29 April 2009, [6.54]-[6.60] (harm to subsistence crops); [6.82]-[6.84] (harm to domesticated animals, including chickens, pigs and cattle); [6.86] (harm to aquaculture).
[80] *Vienna Convention for the Protection of the Ozone Layer*, opened for signature 22 March 1985, 1513 UNTS 293 (entered into force 22 September 1988).
[81] *Convention on Long-range Transboundary Air Pollution*, opened for signature 13 November 1979, 1302 UNTA 217 (entered into force 16 March 1983).

Similar definitions are provided under the *UNFCCC*[82] and the *ASEAN Haze Agreement.*[83] Although these definitions are contained in treaties, the similarity between them provides support for a common understanding of harm under customary international law.[84] References to a threshold level of severity of effects in these definitions can be set aside for the time being, as this is considered separately below. Taken together, these agreements suggest that changes to the physical environment from SAI would qualify as harm so long as they produce a deleterious effect of some kind on either humans, property or the environment. Applying this understanding to scenario 1, the temporary acidification of the waterways in State B would probably qualify as harm as it had a deleterious impact on marine species. Depletion of the ozone layer in scenario 1 would also be likely to qualify as harm, given the risk it poses to human health.

On the basis of this understanding, it could be argued that the mere introduction of particles into the atmosphere, without some kind of adverse or deleterious effect, would be beyond the scope of the no-harm rule. However, before coming to this view, scientists and policy-makers should consider whether the introduction of aerosol particles to the atmosphere will risk impacts on the function and/or resilience of the atmosphere as a system. New developments in Earth Systems Science suggest that this is an important consideration. Rockström et al have identified the amount of aerosol loading in the atmosphere as a one of nine global biophysical thresholds that, if crossed, could generate 'unacceptable' global environmental change and have disastrous consequences for humanity.[85] Scientists are yet to determine the global limit for atmospheric aerosol loading,[86] however, they have calculated it for the South Asian monsoon region. According to Steffen et al, the current level of atmospheric aerosol loading over the South Asian monsoon region has entered into a 'zone of uncertainty', meaning that

[82] *United Nations Framework Convention on Climate Change*, opened for signature 9 May 1992, 1771 UNTS 107 (Entered into force 21 March 1994) art 1(1) ('*UNFCCC*') '"Adverse effects of climate change" means changes in the physical environment or biota resulting from climate change which have significant deleterious effects on the composition, resilience or productivity of natural and managed ecosystems or on the operation of socio-economic systems or on human health and welfare.'

[83] *ASEAN Agreement on Transboundary Haze Pollution*, opened for signature 10 June 2002 (entered into force 25 November 2003) available at <http://haze.asean.org/asean-agreement-on-transboundary-haze-pollution/> art 1(6): '"Haze pollution" means smoke resulting from land and/or forest fire which causes deleterious effects of such a nature as to endanger human health, harm living resources and ecosystems and material property and impair or interfere with amenities and other legitimate uses of the environment.'

[84] See Birnie, Boyle and Redgwell, above n 22, 17. Birnie, Boyle and Redgwell suggest that treaties can provide support for basic rule and principles under customary international law.

[85] Johan Röckstrom et al, 'A safe operating space for humanity' (2009) 461(7263) *Nature* 472, 472.

[86] Ibid, 473

there is less system resilience to human interference and a greater risk of destabilisation.[87] It could therefore be argued that any deliberate increase in atmospheric aerosol loading from SAI, especially in or adjacent to the South Asian monsoon region, will cause an adverse impact on the atmosphere. If the likely impact on the atmosphere's function and resilience is also likely to qualify as 'significant', this would give rise to obligations under the no-harm rule.

7.3.3 Element 3: Threshold level of harm

Obligations under the no-harm rule only arise for risks of harm above a certain threshold level of severity. The ICJ in the *Pulp Mills* case and *Certain Activities* case affirmed that the threshold is 'significant' harm. In the *Certain Activities* case, this threshold was the determining factor as to whether the activities of the Parties triggered procedural obligations to prevent harm and whether the parties had breached the substantive obligation to prevent harm.[88]

Would the risks of harm outlined in scenarios 1, 2 and 3 meet the threshold of 'significant'? Legal scholars generally agree that the assessment as to whether an activity poses a risk of significant transboundary harm is something that needs to be determined on a case-by-case basis.[89] According to Redgwell, certain types of transboundary harm, such as transboundary pollution involving certain toxic or radioactive substances 'may *a priori* be deemed significantly harmful.'[90] International jurisprudence also suggests that certain risks of harm to humans, such as loss of life would probably qualify as 'significant' harm.[91] However, on the whole, customary international law provides little guidance as to how to assess whether the risks posed by SAI proposals would qualify as significant.

Certain aspects of the above scenarios can be drawn upon to estimate if the SAI activities within them would meet this threshold. For example, the increase in acidification of waterways in state B appears to be temporary, and confined to specific areas. The area affected is a national park, and may therefore be particularly vulnerable to increased acid deposition. Nonetheless, while it has impacted on marine species, none appear to have died. This gives the overall impression that the severity of harm may not be great enough to qualify as 'significant'. By

[87] Will Steffen et al, 'Planetary boundaries: Guiding human development on a changing planet' (2015) 347(6223) *Science* 1259855-1, 1259855-2, 1259855-6 – 1259855-7.
[88] See chapter 6.5.2.
[89] Craik, above n 27, 129.
[90] Catherine Redgwell, 'Transboundary pollution: principles, policy and practice ' in S Jayakumar et al (eds), *Transboundary Pollution: Evolving Issues of International Law and Policy* (Edward Elgar, 2015) 11, 15.
[91] See, eg, *Corfu Channel Case* [1949] ICJ Rep 4.

comparison, the impacts of SAI deployment in scenario 2 appear more severe. This scenario involves widespread drought across two states, with impacts on water security and agriculture. However, this assessment is merely based on a common sense-type assessment. The aspects drawn on to make this assessment are not legally prescribed under customary international law. There is also no guidance on how competing factors might be weighed against one another to make an overall determination. Finally, without a clearer understanding of what qualifies as 'significant' harm, it is difficult to tell whether either of these scenarios would meet this threshold and trigger obligations under the no-harm rule.

The ILC proposed a definition of 'significant' in its *Draft Articles on Prevention,* but this proposal does not clarify the issues outlined above. The commentaries to the *Draft Articles on Prevention* state that '"significant" is something more than "detectable" but need not be at the level of "serious" or "substantial".[92] This definition does little to reduce ambiguity. It provides a scale without any fixed reference points (i.e. when an impact is 'substantial', or 'more than detectable'). This may ensure that the no-harm rule is potentially applicable to a wide-range of scenarios, but it leaves determining where a specific risk sits on this scale largely to guesswork. The main shortcoming of the *Draft Articles on Prevention,* however, is that they do not clarify what factors ought to be taken into account when assessing severity of harm, such as the vulnerability of the environment likely to be affected, the physical and/or temporal scale over which impacts are likely to be felt, or the irreversibility of the impacts. The *Draft Articles* therefore provide no guidance as to what factors are relevant for considering whether a proposed SAI activity presents a risk of 'significant' harm.

The decision of the ICJ in the *Certain Activities* case further complicates matters. In this case, the ICJ did not endorse the ILC's definition of significant harm, thereby detracting from the *Draft Articles*' authority as an interpretation of customary international law. [93] Moreover, the ICJ did not provide an alternative definition of 'significant' harm that might be readily applied to other scenarios, such as SAI. In assessing the threshold level in the context of *risk* of transboundary harm, the ICJ also did not follow the 'spectrum' approach proposed by the ILC, in which magnitude of harm is weighed against and the probability of its occurrence.[94] This formulation mirrors the standard approach to assessing risk of environmental harm in domestic

[92] *Draft Articles on Prevention*, above n 59, 152.
[93] *Certain Activities Carried Out by Nicaragua in the Boarder Area (Costa Rica v Nicaragua) & Construction of a Road in Costa Rica Along the San Juan River (Nicaragua v Costa Rica) (Judgment)* (International Court of Justice, General List No 150 & 152, 16 December 2015) [192]. See chapter 6.6.3-4.
[94] Craik, above n 27, 129.

planning and/or environmental protection legislation.[95] In assessing whether a risk of transboundary harm met the required threshold to give rise to due diligence obligations, the ICJ only considered the severity or magnitude of the potential harm and not the likelihood of its occurrence.[96] This approach suggests that severity of harm alone, and not the level of probability, is relevant for assessing whether an activity satisfies this threshold. Under this approach, even a small probability of significant transboundary harm from SAI could theoretically give rise to obligations under the no-harm rule.

The absence of a clear, objective definition or criteria to determine what amounts to 'significant' harm under customary international law may have profound consequences for the capacity of the no-harm rule to respond to the risks of SAI. States may have different understandings as to what qualifies as 'significant' harm. The lack of a common understanding was a problem with regard to the 1986 Chernobyl nuclear disaster. According to Sands and Peel, '[t]he difficult of agreeing [sic] a threshold was illustrated by the Chernobyl accident, which raised numerous issues over what constituted harmful levels of radioactivity in the absence of legally binding international standards.'[97] Without an objective definition or set of criteria for assessing severity of harm, states (and their policy makers and/or scientists) have an overly generous discretion to characterise the severity of transboundary harm and harm to the atmosphere from SAI as they choose.

The lack of an objective definition or set of criteria for determining 'significant' transboundary harm is likely to be more problematic for risks of harm from SAI to the atmosphere. Unlike other risks, such as harm to human health, property and agriculture, harm to the atmosphere has not been considered by an international court or tribunal. Accordingly, there is no precedent to guide any such assessment. Multilateral environment agreements dealing with specific sources of harm to the atmosphere, such as the *UNFCCC* and the *Ozone Convention* refer to the threshold level of significant harm, but similarly do not provide an objective definition that might inform the interpretation of customary international law.[98] Appendix III of the *Convention on Environmental Impact Assessment in a Transboundary Context* (*'Espoo'*) sets

[95] For example, under the *Environmental Protection and Biodiversity Conservation Act 1999* (Cth). *See Matters of Environmental Significance: Significant impact guidelines 1.1 Environmental Protection and Biodiversity Conservation Act 1999*, (2013) Australian Government Department of the Environment < https://www.environment.gov.au/system/files/resources/42f84df4-720b-4dcf-b262-48679a3aba58/files/nes-guidelines_1.pdf> 2-3.
[96] See chapter 6.6.3-4.
[97] Philippe Sands and Jacqueline Peel, *Principles of International Environmental Law* (Cambridge University Press, 3rd ed, 2012) 710.
[98] *UNFCCC* art 1(1); *Ozone Convention* art 1(2).

out a general list of criteria that states may use when considering if an activity is likely to cause significant transboundary harm.[99] However, with the exception of Canada, this convention has only been ratified by European states.[100] Due to its limited membership, the *Espoo Convention* should not automatically be regarded as reflecting or generating customary international law.[101] The issue of severity of harm is further complicated because risks of harm to the atmosphere from SAI, such as increase in stratospheric aerosol loading or depletion of the stratospheric ozone layer (as in scenario 3), would not occur in isolation. Instead, they would exacerbate or contribute to pre-existing environmental problems.

How then should the severity of such impacts be assessed? A possible method to assess harm to the atmosphere *per se* from SAI would be to consider the percentage by which SAI contributes to an existing problem, such as stratospheric aerosol loading or ozone depletion. This approach was taken by the ICJ in the *Certain Activities* case regarding the increase in sedimentation in the San Juan River. The ICJ assessed the severity of the increase in sedimentation on the basis that it was only a two percent increase.[102] Due to the fact that large quantities of sediment were already present in the river and that the amount of sediment naturally varied over time, the ICJ characterised the two percent increase as 'insignificant' and below the threshold level of significant harm.[103] A similar approach could be taken to assess severity of likely impacts from SAI on the atmosphere and global climate system. For example, the percentage increase of atmospheric aerosol loading, or increase in radiative forcing.

However, establishing the percentage of change from SAI would not, on its own, resolve the issues posed by a lack of objective definition or criteria. Without a definition or set of criteria to provide a clear, objective point of reference, the level of a percentage change to an environmental system says nothing about the severity of an impact. The decision of the ICJ in

[99] *Convention on Environmental Impact Assessment in a Transboundary Context*, opened for signature 25 February 1991, 1989 UNTS 309 (entered into force 10 September 1997) ('*Espoo*').
[100] See *Convention on Environmental Impact Assessment in a Transboundary Context*, United Nations Treaty Collection <https://treaties.un.org/Pages/showDetails.aspx?objid=080000028002887c1>.
[101] It is possible for a treaty to 'attract concordant state practice from non-state parties' and for this practice to generate a new rule of customary international law. Donald K Anton, Penelope Mathew & Wayne Morgan, *International Law: Cases and Materials* (Oxford University Press, 2005) 212. However, it is unclear whether the *Espoo* Convention has generated EIA standards under customary international law. In the *Aerial Herbicide Spraying* case, Colombia indicated that it did not believe itself to be bound by the *Espoo* Convention, that there was no equivalent convention in Latin America, and that there was no obligation under customary international law to conduct an EIA. 'Counter Memorial of the Republic of Colombia Volume I', *Arial Herbicide Spraying (Ecuador v Colombia)* International Court of Justice, General List No 138, 29 March 2010, [8.68], [8.73]-[8.75], [8.87]. This is only one example, but it demonstrates that at least one state holds the view that it is not bound by the *Espoo* Convention and that its provisions do not reflect customary international law.
[102] See chapter 6.6.3.
[103] *Certain Activities* (International Court of Justice, General List No 150 & 152, 16 December 2015), [189], [192].

the *Certain Activities* case implied that a percentage change still needs to be assessed *within the context of a particular case*. The ICJ stated that: '… the present case does not concern a situation where sediment contributed by the road exceeds maximum allowable limits, which have not been determined for the San Juan.'[104] This statement suggests that, while a small percentage increase in pollution may not be considered 'significant' for one system, it may be significant for other systems. However, it remains unclear what factors ought to be taken into account when assessing the significance of a percentage change in the context of a given situation. Without any clear objective factors or standards, it will be very difficult to characterise any percentage of change to the atmosphere from SAI as significant or insignificant. The introduction of general definition of significant harm, including clear objective criteria or standards against which harm is to be measured, is therefore needed to provide greater certainty as to when risks of harm from SAI, especially harm to the atmosphere, would satisfy this threshold.[105]

7.3.4 Concluding remarks on the scope of the no-harm rule and SAI

The above analysis suggests that, generally speaking, proposals to engage in SAI would probably fall within the scope of the no-harm rule. The label attached to a proposed SAI activity may, on its own, be a poor indication of whether a state has international obligations under the no-harm rule. Regardless whether a proposal is considered a 'small-scale' field test or 'full-scale' deployment, application of the no-harm rule is determined by three elements: (1) Is the proposal likely to have a transboundary impact? (2) Will the impacts qualify as harm and be the result of a physical act? (3) Will the harm meet the threshold level of 'significant'? Analysis of these elements in light of the hypothetical scenarios suggests that it may not be hard for SAI proposals to satisfy elements (1) and (2). The most difficult element to satisfy appears to be element (3). This difficulty stems from doctrinal ambiguity concerning the meaning of 'significant' harm, as opposed to the nature of SAI proposals.

The lack of an objective definition or set of criteria for determining significant harm may not be problematic in all circumstances. It may still be possible to determine with a reasonable degree of certainty if certain risks of harm from SAI meet this threshold. For example, prior cases suggest that harm to human interests, such as health or property will likely qualify as significant' without the need for further assessment. For this reason, the risks of harm to human

[104] *Certain Activities* (International Court of Justice, General List No 150 & 152, 16 December 2015), [192].
[105] How a set of criteria might be developed is considered in chapter 9.3.2.

health from depletion of the ozone layer in scenario 2 may meet this threshold without needing to be further quantified. Risk of widespread harm to agriculture in scenario 3 is also likely to satisfy this element.

However, other risks are more difficult to assess. As noted above, without further guidance it is difficult to conclude whether the episodic increase in the acidification of waterways in scenario 1 will meet this threshold. Moreover, the lack of a clear understanding of significant harm makes it impossible to assess when a risk of harm to the atmosphere *per se* from a future attempt at SAI would be 'significant' so as to trigger obligations under the no-harm rule. Taken in isolation from other impacts, it is difficult to tell whether the risk of harm to the ozone layer in scenario 2 would meet this threshold. Similarly, it is unclear when changes to regional precipitation patterns in scenario 3 would, on their own, be considered significant harm to the atmosphere and climate system. In the absence of further indirect impacts on the territory of another state, it may be impossible to determine when a risk of harm to the atmosphere *per se* will trigger obligations under the no-harm rule. In this sense, the practical operation of this element does not adequately support the normative aspiration to prevent significant harm to the global commons *per se* under the no-harm rule.

7.4 WHAT MUST STATES DO TO COMPLY WITH THE NO-HARM RULE IF THEY ATTEMPT SAI?

This section considers the standard of care required to satisfy the no-harm rule. If a proposed SAI activity falls within the scope of the no-harm rule, what obligations will states then have to satisfy? This section begins by considering what states must do to satisfy the duty of conduct (i.e. due diligence) to prevent significant transboundary harm. This includes relevant procedural obligations. This section suggests that future attempts at SAI may warrant a higher standard of care. It therefore considers the possibility that future attempts at SAI might attract a standard of strict responsibility for harm (i.e. a 'duty of result').

This section focuses on state obligations because, as a principle of customary international law, the no-harm rule only binds state actors. It does not automatically bind non-state or private actors, such as companies, non-governmental organisations or individual citizens. However, the no-harm rule may nevertheless be relevant if a non-state actor should attempt SAI. Under the customary international law rules of state responsibility, the activities of non-state actors may be attributed to a state in certain circumstances, for example, if a private individual or

company is acting under the instruction, direction or control of a state.[106] Depending on the circumstances, a state could therefore potentially be held responsible for breaching the no-harm rule even if SAI was conducted by a private actor. Furthermore, as explained in greater detail below, in order to fulfil their due diligence obligation states may have a duty to enact and enforce domestic law to prevent significant transboundary harm from SAI.[107] This in turn would potentially affect the activities of private individuals and companies. Therefore, the no-harm rule could have significant bearing (albeit indirectly) on non-state actors should they wish to attempt SAI.

7.4.1 Duty of conduct to prevent significant transboundary harm and harm to the global commons from SAI

States wishing to attempt SAI in the future have a duty of conduct or 'due diligence' to prevent their actions from causing significant transboundary harm to the territory of other states and to the global commons. In accordance with the decision in the *Pulp Mills* case, this means that a state must use 'all the means at its disposal' to prevent activities under its jurisdiction from causing significant transboundary harm and harm to the global commons.[108] Therefore, if a proposed SAI activity falls within the scope of the no-harm rule, the state in question must exert its best possible efforts to prevent it from causing significant harm to other states and the atmosphere.

Exactly what these efforts should be will depend on the context of the SAI activity being proposed. The ILC *Draft Articles on Prevention* state that the relevant standard of due diligence should be 'appropriate and proportional to the degree of risk of transboundary harm.'[109] Therefore, in the hypothetical scenarios, the relevant standard of due diligence would in part be determined by the nature of the proposed SAI activity alone and the degree of risk it presents. The *Draft Articles on Prevention* suggests that relevant considerations include the size, location and climatic conditions relating to a project. Special Rapporteur Murase in his third report on

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[106] *See 'Draft Articles on Responsibility of States for Internationally Wrongful Acts, with commentaries'* (2001) II(2) Yearbook of the International Law Commission 31, art 8 (*'Draft Articles on State Responsibility').* See also *Zafiro Case (Great Britain v United States)* (1925) 6 RIAA 160, 163*; Military and Paramilitary Activities in and against Nicaragua, (Nicaragua v US) (Merits) (*1986) ICJ Rep 14 [64]-[65]*; Bosnian Genocide case (Bosnia v Serbia) (2007)* ICJ Rep 43, 205.

[107] For an example of what domestic geoengineering law might look like, see *An Act Relating to Health and Safety- Geoengineering,* State of Rhode Island, H 7578 (11 February 2016). For further discussion of this Bill, see *Forum Discussion- Rhode Island H7578: The Climate Geoengineering Act of 2016*, The Forum for Climate Engineering Assessment, (22 August 2016) < http://ceassessment.org/forum-discussion-rhode-island-h-7578-the-climate-geoengineering-act-of-2016/>.

[108] *Pulp Mills* [2010] ICJ Rep 14, [101].

[109] *Draft Articles on Prevention*, above n 59, 154.

the Protection of the Atmosphere for the ILC suggests that when it comes to activities relating to the atmosphere, the required standard of care will depend on the scale and magnitude of a planned activity as well as the 'significance or irreparability of the adverse effects which that activity is expected to cause, or is likely to cause'.[110] In scenarios above, the required standard of due diligence that States A and E must satisfy will therefore depend in part on the nature of the proposed SAI activity. As a result, large-scale field tests (scenario 2) and full-scale deployment (scenario 3) will attract a higher standard of care than small-scale field tests (scenario 1).

The standard of due diligence may depend on factors in addition to the nature of the activity. Peel suggests that the relevant standard of due diligence may also depend on the 'capacities and capabilities of the States concerned.'[111] This understanding of due diligence reflects the principle of common but differentiated responsibilities as articulated in *Rio* principle 7.[112] This does not mean that developing states have carte blanche to engage in activities that pose a risk of transboundary harm, or that a lower standard of due diligence will be justifiable in all circumstances.[113] In this regard, Birnie, Boyle and Redgwell draw attention to the *Pulp Mills* case, noting that 'Uruguay – a developing state – made no attempt to dispute Argentina's claim that the applicable standard of care was anything less than state-of-the-art technology'.[114] Similarly, in the *Activities in the Area* Advisory Opinion, the Seabed Disputes Chamber did not differentiate the responsibility of developing states from developed states when sponsoring deep seabed mining activities, in order to ensure 'high standards of protection of the marine environment'.[115] It is therefore difficult to conclude if and how the different capabilities of developing states, such as State E, should be taken into account if they wish to attempt SAI. If they are to be taken into account relevant considerations might include the extent to which the state can effectively control its own territory and the resources it has available to address the risk of harm.[116] These details have not specifically been set out in the scenarios. However, as

[110] Shinya Murase, 'Third report on the protection of the atmosphere', Protection of the Atmosphere, International Law Commission, 68th sess, UN Doc A/CN.4/692 (2 May-10 June and 4 July-12 August 2016), 9.
[111] Jacqueline Peel, 'Unpacking the elements of a state responsibility claim for transboundary pollution ' in S Jayakumar et al (eds), *Transboundary Pollution: Evolving Issues of International Law and Policy* (Edward Elgar 2015) 51, 63. See also Shinya Murase, 'Third report on the protection of the atmosphere', Protection of the Atmosphere, International Law Commission, 68th sess, UN Doc A/CN.4/692 (2 May-10 June and 4 July-12 August 2016), 9.
[112] For a critique of this principle in the context of transboundary harm see Peel, above n 111, 63-65.
[113] Birnie, Boyle and Redgwell, above n 22, 149.
[114] Ibid.
[115] *Activities in the Area*, [2011] ITLOS Reports 10, [153]-[161]. See also Sands and Peel, above n 97, 236.
[116] See Birnie, Boyle and Redgwell, above n 22, 148.

a developing country, the relative capacity of State E to prevent harm might be lower than state A, and may justify a lower standard of care.[117]

The flexibility inherent in this understanding of due diligence has its drawbacks. It has been criticised as setting a 'vague' standard of care.[118] It is challenging to pinpoint precisely what response by a source state would be considered 'appropriate and proportional' to the potential risks posed by SAI field testing or deployment. Nevertheless, the analysis in chapter six suggests that in order to satisfy the obligation of due diligence states must also satisfy a number of subsidiary obligations that are more specific and well-defined. These are examined in turn below.

Duty to adopt and enforce domestic law

In order to satisfy the duty of due diligence, states must enact 'appropriate rules and measures' at a domestic level in order to prevent significant transboundary harm and harm to the global commons from proposed SAI activities.[119] This obligation was affirmed by the ICJ in the *Pulp Mills* case.[120] In that case, the ICJ held that states must also adopt:

> [A] certain level of vigilance in their enforcement and the exercise of administrative control applicable to public and private operators, such as the monitoring of activities undertaken by such operators, to safeguard the rights of the other party.[121]

Enforcement was a key issue in the 2016 judgment of the Permanent Court of Arbitration (PCA) in the *South China Seas Arbitration*.[122] This decision was in the context of the general obligation to protect and preserve the marine environment of the high seas under article 192 of *UNCLOS*, which codifies the no-harm rule. The PCA held that while China had adopted rules and measures prohibiting harmful fishing practices, it had not adequately enforced them.[123] It therefore held that China had breached its obligation of due diligence under article 192.[124] In order to satisfy the duty of due diligence, states A and E would therefore need to enact appropriate rules concerning SAI *and* vigilantly enforce them.

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[117] See, Peel, above n 111, 64. Peel suggests that developing states might claim that they should be held to a lower standard of care than developed states.
[118] See ibid, 63.
[119] *Pulp Mills* [2010] ICJ Rep 14, [197]. See also 'Reply of Ecuador Volume I', *Arial Herbicide Spraying (Ecuador v Colombia)* International Court of Justice, General List No 138, 31 January 2011 [2.72]-[2.154].
[120] *Pulp Mills* [2010] ICJ Rep 14.
[121] Ibid, [197].
[122] *The South China Sea Arbitration (Philippines v China) (Awards)* (Permanent Court of Arbitration, Case No 2013-19, 12 July 2016) [964]-[966], [973]-[975].
[123] Ibid.
[124] Ibid, [964].

At the present time, it is unclear precisely what rules would be appropriate at a domestic level for SAI. It was noted in the *Pulp Mills* case that, where relevant, the rules and measures adopted by states must conform to applicable international guidelines, such as those promoted by international technical bodies.[125] This is of little use for SAI. As noted in chapter one, scientists and policy-makers have proposed non-binding, voluntary codes of conduct for geoengineering research.[126] However, these are not universally accepted. At the present time, there are no official international guidelines for regulating SAI that states A and E might draw on to inform domestic lawmaking.

In lieu of official guidelines, it could be argued that the only appropriate option for states A and E will be to enact a moratorium under domestic law against SAI field testing and/or full scale deployment. The current scientific understanding of the potential impacts of SAI is extremely limited.[127] A moratorium would therefore be in keeping with the precautionary approach, as discussed below. A moratorium is further supported by the 2010 Conference of the Parties decision X/33 to the *Convention on Biological Diversity* (‘*CBD*’).[128] Decision X/33 which called for ‘no climate-related geo-engineering activities that may affect biodiversity’ to take place ‘until there is an adequate scientific basis on which to justify such activities and appropriate consideration of the associated risks.’[129] The exception to this moratorium is small-scale experiments conducted in a controlled environment.[130] Decision X-33 is non-binding on states and applies to geoengineering activities in general (not just SAI). However, given the wide membership of the CBD (196 states) it is a strong indication of the current view of states concerning relevant conduct for geoengineering.[131] It suggests that, until there is greater scientific understanding of the likely impacts of SAI, the only appropriate measure that states might take at a domestic level would be to prohibit any field testing or deployment.

Short of an outright prohibition, what other options might a state consider for domestic regulation? One option would be to enact laws that require public and/or private operators to

[125] *Pulp Mills* [2010] ICJ Rep 14, [197]. See also Alan Boyle, 'Transboundary air pollution: a tale of two paradigms ' in S Jayakumar et al (eds), *Transboundary Pollution: Evolving Issues of International Law and Policy* (Edward Elgar, 2015) 233, 241.
[126] Chapter 1.3.
[127] See chapter 1.2.2.
[128] *Decision adopted by the Conference of the Parties to the Convention on Biological Diversity at its Tenth Meeting x/33, Biodiversity and Climate Change*, 10th mtg, Agenda Item 5.6, UNEP/CBD/COP/DEC/X/33 (29 October 2010) paragraph 8(w) (‘*Decision X/33*’).
[129] Ibid.
[130] Ibid.
[131] *List of Parties*, Convention on Biological Diversity, <https://www.cbd.int/information/parties.shtml>. This number is of 3 November 2016.

apply for a permit on the basis of an EIA before commencing any outdoor experimentation. States could also pass laws requiring continuous monitoring and review of the impacts and side-effects of any SAI attempts.[132] In order to further satisfy the requirements for enforcement and administrative control, states could enact regulation to facilitate government and/or external audit of any SAI field testing or deployment programs.[133] As scientific understanding improves, it may be appropriate for states to enact more specific rules, such as the type and quantity of aerosols to be used and the timeframe and atmospheric conditions within which they are to be released.[134]

A number of these measures have been set forth in a bill introduced in February 2016 to the General Assembly of the State of Rhode Island in the United States titled *The Climate Geoengineering Act of 2016*.[135] The Bill has not yet been adopted – it is being held for further study.[136] However, it is the first attempt by a state (in the domestic or international sense) to regulate SRM geoengineering. The object of the Bill is to prevent negative impacts from SRM (including SAI) within the territory of Rhode Island if it is attempted. If passed into law, the Bill will require any person (including individuals, companies and government bodies) that proposes to attempt SRM to conduct an EIA for research and deployment of SRM about a certain threshold of radiative forcing (the amount of solar radiation reflected away from the Earth).[137] SRM proposals, including field testing and full-scale deployment, will be subject to an approval process and ongoing impact assessment.[138] The Bill also seeks to establish domestic enforcement measures against persons who do not comply, being a fine and/or imprisonment.[139] It is beyond the scope of this research to assess the adequacy of this Bill. Nonetheless, it provides a concrete example of regulatory measures states might take at a

[132] An example of such a system is the management regime established by the Tribunal in the *Trail Smelter* arbitration. See chapter 4.4.2.
[133] See 'Counter Memorial of the Republic of Colombia Volume I', *Arial Herbicide Spraying (Ecuador v Colombia)* International Court of Justice, General List No 138, 29 March 2010, [8.60].
[134] 'Counter Memorial of the Republic of Colombia Volume I', *Arial Herbicide Spraying (Ecuador v Colombia)* International Court of Justice, General List No 138, 29 March 2010, [8.60]. It goes without saying that SAI proposals are vastly different in nature and scale from Colombia's aerial herbicide spraying program. Nonetheless, this case gives some indication as to the types of domestic laws that may be adopted and modified for SAI.
[135] *An Act Relating to Health and Safety- Geoengineering*, State of Rhode Island, H 7578 (11 February 2016)
[136] See *Rhode Island House Bill 7578*, Legiscan, < https://legiscan.com/RI/bill/H7578/2016>. This was recommended on the 25 February 2016.
[137] *An Act Relating to Health and Safety- Geoengineering*, State of Rhode Island, H 7578 (11 February 2016) 23-33.8-4.
[138] Ibid, 13-33.8-4, 13-33.8-5.
[139] Ibid, 13-33.8-6

domestic level to prevent significant harm – including transboundary harm and harm to the atmosphere from SAI.

Procedural obligations flowing from the no-harm rule

States wishing to attempt SAI must satisfy a number of procedural obligations relating to the duty to prevent significant transboundary harm. The *Certain Activities* case affirmed that states have three procedural obligation that flow sequentially on from one another.[140] These are the obligation to ascertain risk, the obligation to conduct an EIA and the obligation to notify and consult with other potentially affected states.

Before attempting SAI, States A and E must ascertain if the proposed activity poses a risk of significant transboundary harm or harm to the atmosphere. As mentioned above, this procedural obligations overlaps with the issue of foreseeability of harm. Whether an activity poses a foreseeable risk of significant harm is not simply a question of scope. States essentially have a positive obligation to ascertain whether a proposed activity presents a risk of significant transboundary harm or harm to the global commons.[141] States A and E could satisfy this obligation by conducting a preliminary risk assessment.[142]

If preliminary assessment confirmed a risk of significant transboundary harm or harm to the atmosphere, States A and E would then be obliged to conduct an EIA.[143] The decision in the *Pulp Mills* case suggested that this obligation exists separately under customary international law. [144] However, it is also essential to fulfil the duty of due diligence under the no-harm rule. As stated by Judge Owada in his separate opinion in the *Certain Activities* case:

> [C]onducting an environmental impact assessment is one important constituent element of the process that emanates from the international obligation of States to act in due diligence to avoid or mitigate significant transboundary harm[145]

[140] See chapter 6.6.4.
[141] *Certain Activities and Construction of a Road*, (International Court of Justice, General List No 150 & 152, 16 December 2015), [104]; See also Shinya Murase, 'Third report on the protection of the atmosphere', Protection of the Atmosphere, International Law Commission, 68th sess, UN Doc A/CN.4/692 (2 May-10 June and 4 July-12 August 2016), 10.
[142] *Certain Activities and Construction of a Road*, (International Court of Justice, General List No 150 & 152, 16 December 2015), [154].
[143] Ibid, [104]
[144] *Pulp Mills* [2010] ICJ Rep 14, [204].
[145] *Certain Activities and Construction of a Road* (International Court of Justice, General List No 150 & 152, 16 December 2015) (Owada J) [18].

Despite the fundamental role of EIA, customary international law does not explicitly prescribe the content of an EIA. At a minimum, it must be conducted *before* a proposed SAI activity is commenced.[146] It must take into account the nature and magnitude of a proposed SAI activity and the likely adverse impacts it might have on the environment.[147] According to Boyle, an EIA must also 'assess possible effects on people, property and the environment of other States likely to be affected.'[148] However, the ICJ in the *Pulp Mills* cases, made clear that it is otherwise up to individual states to determine the specific content of an EIA under customary international law.[149] That is, it is up to states to decide the way in which the EIA is to be conducted (e.g. the methodology of the EIA), who carries it out, and how the results of the EIA are to be made public.[150] States that are party to the *Espoo* Convention would be bound by more detailed guidelines set out under that agreement.[151] However, this convention has only been ratified by European states and Canada,[152] so the application of its guidelines is limited. The vast majority of states in the international system (including the US, China and other major developing countries) therefore have a great deal of discretion as to how they might conduct an EIA for any future attempts at SAI.

International law scholars have nevertheless made recommendations as to how states might conduct an EIA for geoengineering research activities. According to Craik, '[t]he baseline requirements to satisfy due diligence would include the identification of environmental impacts, a determination of the risk that the impacts pose, publication of the results, and usually an opportunity for public consultation.'[153] Hubert and Reichwein propose that a comprehensive EIA might include consideration of the scale, duration and intensity of a proposed SAI activity, and set out contingency plans in case of an emergency.[154] Craik further suggests that states should assess cumulative impacts that may develop over time and continually monitor and

[146] *Certain Activities and Construction of a Road*, (International Court of Justice, General List No 150 & 152, 16 December 2015) [161].
[147] *Pulp Mills* [2010] ICJ Rep 14, [205].
[148] Alan Boyle, 'Developments in the International Law of Environmental Impact Assessments and their Relation to the Espoo Convention' (2011) 20(3) *Review of European Community & International Environmental Law* 227, 229.
[149] *Pulp Mills* [2010] ICJ Rep 14, [205].
[150] Craik, above n 27, 123.
[151] *Espoo Convention.*
[152] See *Convention on Environmental Impact Assessment in a Transboundary Context*, United Nations Treaty Collection, <https://treaties.un.org/Pages/showDetails.aspx?objid=080000028002887c>.
[153] Craik, above n 27, 132.
[154] Anna-Maria Hubert and David Reichwein, 'An Exploration of a Code of Conduct for Responsible Scientific Research involving Geoengineering: Introduction, Draft Articles and Commentaries' (IASS, Potsdam Institute for Science, Innovation and Society, University of Oxford, 2015) 75, draft article 14.

assess geoengineering activities.[155] It would be prudent for States A and E to follow these suggestions when conducting an EIA for their respective SAI activities. According to Hubert and Reichwein, it would also be prudent for states to also consider any other geoengineering activities when conducting an EIA.[156] Therefore, in scenario 3, it would be prudent for State E to take into account the SAI program of state A when conducting an EIA for its own SAI program.

In scenarios 1 and 2, it might also be prudent for State A to consider whether field testing is necessary to achieve the research aims of the respective projects. Craik and Hubert and Reichwein agree that states ought to consider alternative and less risky methods of research for field testing as part of conducting an EIA for SAI. This may not be prescribed under customary international law.[157] However, according to Craik '[a]ssessing alternatives is considered by many as central to the EIA process, since alternative-analysis gives decision-makers and the public a range of options to compare, including the option of not proceeding with the activity.'[158] In this sense, an EIA might further complement decision-making processes under domestic law as discussed above. Craik further suggests that considering alternative options would be paramount to prevent significant transboundary harm from geoengineering given the lack of clear safety standards.[159] Therefore, before proceeding with the SAI field tests in scenarios 1 and 2, it would be prudent for State A to consider whether the aims of Projects *Alpha* and *Bravo* might be achieved by other means, such as climate modelling, laboratory experiments or observing the properties of naturally occurring atmospheric aerosols.[160]

If the EIA confirms a risk of significant transboundary harm or harm to the global commons, states A and E would then have a duty to notify and consult with potentially affected states.[161] This is relatively straightforward for the risks of transboundary harm posed to states B, C and D as it is clear *who* the source state should notify and consult with. However, it is not clear who States A and E should notify and consult with regarding risks of significant transboundary harm posed to the atmosphere, such as depletion of the stratospheric ozone layer and changes to regional precipitation patterns. There is no individual representative body responsible for the

[155] Craik, above n 27, 132.
[156] Hubert and Reichwein, above n 154, draft article 14.
[157] Craik, above n 27, 132.
[158] Ibid, 132. Craik further states that providing a 'no action' alternative is important, as it would require the person proposing the geoengineering activity to justify it (at 132-133).
[159] Ibid, 132.
[160] See ibid, 132-133.
[161] *Certain Activities and Construction of a Road*, (International Court of Justice, General List No 150 & 152, 16 December 2015), [168]. See also *Rio Declaration*, principle 19.

protection of the atmosphere as a whole.[162] It could be argued that states themselves should still be notified because all states share an equal interest in the protection of the atmosphere.[163] But it would not be appropriate for an individual state to be notified and consulted regarding potential impacts on the atmosphere from SAI. As an alternative, Craik proposes that the international community be notified and consulted as a collective through existing international organisations.[164] Potential options include the UN General Assembly and the UN Security Council. However, it is beyond the scope of this research to consider the suitability of these bodies and the extent to it would be within their mandate to consult with states on behalf of the atmosphere should they wish to attempt SAI.

Obligation to take a precautionary approach

States A & E may be required to adopt a precautionary approach. The precautionary approach is articulated in *Rio* principle 15:

> In order to protect the environment, the precautionary approach shall be widely applied by States according to their capabilities. Where there are threats of serious or irreversible damage, lack of full scientific certainty shall not be used as a reason for postponing cost-effective measures to prevent environmental degradation.

According to Scott, there is no substantive difference between the 'precautionary approach' and 'precautionary principle' – both are commonly used to refer to the same requirement.[165] For the sake of consistency, this project will continue to use the term 'approach' where possible. Regardless of terminology, it is unclear whether the precautionary approach is a binding rule of customary international law in its own right.[166] Furthermore, the precise meaning of the precautionary approach is disputed.[167] One possible interpretation is that states

[162] Craik, above n 27, 136.
[163] Ibid, 136.
[164] Ibid.
[165] Karen N Scott, 'International Law in the Anthropocene: Responding to the Geoengineering Challenge ' (2013) 34 *Michigan Journal of International Law* 309, 241-342. But see Jonathan B Wiener, 'Precaution' in Daniel Bodansky, Jutta Brunnée and Ellen Hey (eds), *The Oxford Handbook of International Environmental Law* (Oxford University Press, 2007) 597, 601. According to Wiener, the United States has repeatedly advocated for the use of the term 'precautionary approach' rather than 'precautionary principle' in international agreements. This suggests that there the terms have a different meaning and/or legal status.
[166] *Responsibilities and Obligations of States Sponsoring Persons and Entities with Respect to Activities in the Area (Advisory Opinion)*, [2011] ITLOS Reports 10 [135] ('*Activities in the Area'*). This decision suggests that there is a trend towards the precautionary principle becoming customary international law. However, leading international law scholars are less certain. See, eg, Shinya Murase, 'Third report on the protection of the atmosphere', Protection of the Atmosphere, International Law Commission, 68th sess, UN Doc A/CN.4/692 (2 May-10 June and 4 July-12 August 2016), 19-20; Redgwell, above n 90, 20. According to Redgwell, *Rio* principle 15 is 'phrased in very general terms and lacks the normative character of the rule of law.'
[167] Redgwell, above n 90, 20.

must be more cautious when *responding* to identified risks.[168] Another interpretation is that states must be more cautious in *identifying* risks where there is scientific uncertainty.[169]

Either way, the precautionary approach may shape how states A and E ought to interpret their obligation to prevent significant transboundary harm and harm to the global commons from SAI. The ICJ in the *Pulp Mills* case held that the precautionary approach did not reverse the burden of proof.[170] But it nevertheless suggested that the precautionary approach may influence how states are to interpret their international environmental obligations.[171] Judge Cançado Trindade in his separate opinion in *Certain Activities* explained that the precautionary approach influences the interpretation of the no-harm rule as follows:

> [W]hile the principle of prevention assumes that risks can be objectively assessed so as to avoid damage, the precautionary principle assesses risks in face of uncertainties, taking into account the vulnerability of human beings and the environment, and the possibility of irreversible harm.[172]

In other words, it requires states to take a more flexible approach in the face of scientific uncertainty for determining when an activity poses a foreseeable risk of harm.

In this view, States A and E should take a precautionary approach to assessing whether the proposed SAI activities in the scenarios pose a foreseeable risk of significant transboundary harm and/or harm to the global commons. It may not be possible for each state to identify the nature and extent of *all* risks posed by SAI.[173] There may be insufficient scientific data to 'demonstrate or quantify the risk or prove a cause-and-effect relationship' between the SAI proposal and a possible adverse effect.[174] For example, it may not be scientifically possible to demonstrate with certainty the risk of acidification of waterways in scenario 1, ozone depletion in scenario 2, or drought in scenario 3. However, regardless of any such uncertainty, States A and E would still have a duty of due diligence to take preventive measures. In particular, they would still be required to conduct an EIA and notify and consult with States B, C and E respectively.

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[168] Birnie, Boyle and Redgwell, above n 22, 155.
[169] Ibid, 155.
[170] *Pulp Mills* [2010] ICJ Rep 14, [164].
[171] Ibid, [164]. In that case, the ICJ speculated that the precautionary approach may be relevant to the interpretation of the Statute of the River Uruguay, upon which the dispute was based. See also See also *Activities in the Area*, [2011] ITLOS Reports 10 [135]; Scott, above n 165, 324.
[172] *Certain Activities Carried Out by Nicaragua in the Boarder Area (Costa Rica v Nicaragua) & Construction of a Road in Costa Rica Along the San Juan River (Nicaragua v Costa Rica) (Judgment)* (International Court of Justice, General List No 150 & 152, 16 December 2015) (Cançado Trindade J) [55].
[173] Scott, above n 165, 343.
[174] Reichwein et al, above n 17, 154.

The risks of SAI versus the risks of climate change

It important to briefly consider the relationship between the risks posed by SAI and the risks posed by climate change. As noted in chapter two, a number of legal scholars have queried the way in which the no-harm rule should be interpreted to apply to geoengineering, as geoengineering is intended to address the risks of transboundary harm and harm to the global commons posed by climate change.[175] This issue is highlighted in scenario 3, in which state E decides to attempt SAI in order to avert the severe risks it faces from climate change. The risks of climate change might be a relevant consideration in the context of a claim for state responsibility if significant transboundary harm is caused by SAI. Under the doctrine of state responsibility, there are numerous circumstances that preclude 'wrongfulness' (i.e. breach of a primary rule of international law), and hence state responsibility.[176] Relevant considerations in the context of scenario 3 might include *force majeure* and necessity.[177] However, these considerations relate to secondary rules of state responsibly, and not to the content of the no-harm rule as a primary rule of customary international law. There is nothing in the analysis in chapters four, five and six to suggest that the need to act against the risks of climate change would change the obligation of state E to *prevent* significant harm from SAI under the no-harm rule.[178] State E's obligations under the no-harm rule would therefore remain the same.

7.4.2 Should SAI attract a higher standard of care?

This section considers if future attempts at SAI would warrant a higher standard of care than the duty of due diligence as outlined above. The duty of due diligence presupposes that it is possible to take action to prevent and/or minimise the risks of significant transboundary harm and/or harm to the global commons from an activity. It does not address situations in which there is a foreseeable risk of significant harm which *cannot* be prevented or minimised.[179] This

[175] See chapter 2.1. See also Jesse Reynolds, 'Climate Engineering Field Research: The Favorable Setting of International Environmental Law' (2014) 5 *Washington and Lee Journal of Energy, Climate, and the Environment* 417, 477; Scott, above n 165, 335; Daniel Bodansky, 'Governing Climate Engineering: Scenarios for Analysis' (2011) 47(11) *Harvard Project on Climate Agreements Discussion Paper* 1, 15.
[176] *Draft Articles on State Responsibility*, above n 105, chapter v.
[177] Ibid, art 23, art 25.
[178] Articles 9 and 10 of the ILC *Draft Articles on Prevention* propose that states should consult with one another with a view to achieving an 'equitable balance of interests'. Article 10 states that a relevant consideration in this regard is the importance of the activity to a source state. See *Draft Articles on Prevention*, above n 59. However, this recommendation by the ILC has been criticised as not representing customary international law. See Timothy Stephens, *International Courts and Environmental Protection* (Cambridge University Press, 2009) 159.
[179] L F E Goldie, 'Liability for Damage and the Progressive Development of International Law' (1965) 14(4) *The International and Comparative Law Quarterly* 1189, 1196; John M Kelson, 'State Responsibility and the Abnormally Dangerous Activity ' (1972) 13(2) *Harvard International Law Journal* 197, 228-229. See also, Günther Handl, 'Transboundary Impacts' in Daniel Bodansky, Jutta Brunnée and Ellen Hey (eds), *The Oxford*

may limit the no-harm rule's capacity to respond to the risks posed by SAI. It may be possible to reduce certain risks from SAI, such as the 'termination problem': the risk of rapid temperature increase if SAI is suddenly stopped and atmospheric concerntration of GHGs remains high.[180] Reynolds, Parker and Irvine suggest that the likelihood and severity of the termination problem can be reduced by gradually ramping down the scale of SAI deployment, rather than suddenly stopping.[181] In other words, the risk can be reduced by careful project design and management. However, certain impacts may be inherent in the technology itself, for example, widespread change to the global climate and an increase in atmospheric aerosol loading. In this sense, SAI is distinct from so-called 'ultrahazardous activities' as understood by the ILC's *Draft Articles on Prevention*. That is, 'an activity with a danger that is rarely expected to materialize but might assume, on that rare occasion, grave (more than significant, serious or substantial) proportions.'[182] As the impacts are inherent in proposed SAI, satisfying the duty of due diligence may not adequately reduce their probability or likely severity.

The possibility of a higher standard of care has been raised in prior disputes. In correspondence leading up to the 1972 *Nuclear Tests* Cases, New Zealand described atmospheric nuclear testing as an 'inherently harmful' activity, because certain risks could not be sufficiently prevented or minimised.[183] It stated that 'an activity that is inherently harmful is not made acceptable even by the most stringent precautionary measures.'[184] More recently in the *Aerial Herbicide Spraying* case, Ecuador claimed that Colombia's spraying program was 'inherently hazardous', and suggested that a higher standard of care was appropriate.[185] The ICJ did not produce a judgment on the merits of either case, and therefore did not consider this issue.

Handbook of International Environmental Law (Oxford University Press, 2007) 531, 540. Handl similarly suggests that this is a limitation of the ILC's *Draft Articles on Prevention*.

[180] See chapter 1.2.2.

[181] Jesse L. Reynolds, Andy Parker and Peter Irvine, 'Five solar geoengineering tropes that have outstayed their welcome' (2016 (forthcoming)) *Earth's Future* doi: eft2.2016EF000416 3. Cf Wil Burns, 'A Response to: Five solar geoengineering tropes that have outstayed their welcome' 1 FCEA Commentary, < http://ceassessment.org/commentary-a-response-to-five-solar-geoengineering-tropes-that-have-outstayed-their-welcome-wil-burns/>.

[182] *Draft Articles on Prevention*, above n 59, 149. The possibility that SAI might also qualify as an ultrahazardous activity is consider by Reichwein et al, above n 17, 166. See also Barbara Saxler, Jule Siegfried and Alexander Proelss, 'International liability for transboundary damage arising from stratospheric aerosol injections' (2015) 7(1) *Law, Innovation and Technology* 112.

[183] See chapter 5.3.1.

[184] Letter from New Zealand Prime Minister to French Foreign Minister, 9 March 1973' in 'Application Instituting Proceedings Submitted by the Government of New Zealand' *Nuclear Tests Case (New Zealand v France)* [1973] ICJ Pleadings 2, 37.

[185] 'Memorial of Ecuador Volume 1' *Arial Herbicide Spraying (Ecuador v Colombia)* International Court of Justice, General List No 138, 29 April 2009, [8.26]-[8.28]. See chapter 6.5.3.

Proposals to develop SAI bring this question to the forefront and suggest that it warrants further consideration.

The current lack of scientific understanding and consensus concerning SAI also raises questions as to the efficacy of a duty of due diligence. SAI proposals are novel and without precedent. Unlike other so-called 'ultrahazardous' activities such as nuclear energy, there are no established international standards for SAI against which to assess the exercise of due diligence. This issue was raised above in the context of establishing 'significant' harm. However, SAI also presents an issue regarding the standard of care as there are no international guidelines that scientists and/or policymakers might use as a basis for determining the necessary standard of due diligence. In other words, it may not be possible to determine what action is 'necessary' to minimise the risk of significant transboundary harm or harm to the global commons from SAI.[186]

This raises the question- *do states have a higher standard of care when it comes to future attempts at SAI*? In the context of the hypothetical scenarios above, would states A and E need to take more stringent measures to satisfy their obligations under the no-harm rule? Reichwein et al suggest that the standard of due diligence for SAI might be higher than other activities. They state that '[t]he mere possibility that an SAI deployment would pose the risk of serious or irreversible harm argues in favour of a high standard of care for a state in meeting its obligation of due diligence.'[187] However, this standard may require more than just extra preventative or precautionary measures. According to Handl, the only logical way to satisfy the duty of due diligence for inherently harmful activities may be not to attempt them at all.[188] In other words, the relevant standard of care is still one due diligence, but it might be so high that States A and E would effectively be prohibited from attempting SAI.

Alternatively, it could be argued that States A and E have a duty of result (i.e. strict/absolute responsibility) to prevent significant transboundary harm from SAI. In other words, they should be held liable for transboundary harm and/or harm to the global commons from SAI regardless of having satisfied the obligation of due diligence.[189] There is some state practice exhibited in

[186] See Kelson, above n 179, 227; Goldie, above n 179, 1203.
[187] Reichwein et al, above n 17, 180.
[188] Handl, above n 179, 540.
[189] See Alexandre Kiss and Dinah Shelton, 'Strict Liability in International Environmental Law' in Tafsir Malick Ndiaye and Rüdiger Wolfrum (eds), *Law of the Sea, Environmental Law and Settlement of Disputes* (Brill Nijhoff, 2007) 1131, 1131.

international treaty-making to suggest that ultrahazardous activities attract a duty of result.[190] For example, under the 1972 *Convention for Liability for Damage Caused by Space Objects*, states are absolutely liable for damage caused by objects they have launched into space.[191] However, strict/absolute liability regimes tend to focus on liability for private actors, rather than states.[192] Examples include the 1963 *Vienna Convention on Civil Liability for Nuclear Damage*[193], the *Protocol of 1992 to amend the International Convention on Civil Liability for Oil Pollution Damage 1969*[194], and the 1991 *Protocol on Environmental Protection to the Antarctic Treaty*.[195] Brunnée suggests that states have been reluctant to impose strict liability on themselves even in instances of environmental damage from ultrahazardous activities.[196] It is therefore uncertain whether states A and E would have a duty of result on this basis.

The other possibility for imposing a duty of result on States A and E is the interpretation flowing from the *Certain Activities* case. That is, that states have two separate obligations concerning transboundary pollution: an obligation 'not to cause' harm and an obligation to 'prevent' harm.[197] As noted in chapter six, this interpretation of the no-harm rule also does not appear to be supported by widespread state practice. However, the idea that states may have two obligations has been raised by several legal scholars.[198] Most recently, it has been raised by Murase in his third report as Special Rapporteur for the ILC's new project on the Protection of the Atmosphere. Murase suggests that the no-harm rule stemming from the *Trail Smelter* arbitration 'prohibits harmful transboundary impacts'.[199] In other words, it provides a duty of result. According to Murase, the duty of states to take preventative measures (i.e. duty of conduct) is a 'corollary' of the no-harm rule. He further suggests that under this duty to prevent

[190] See ibid, 1140; C Wilfred Jenks, *Liability for Ultra-Hazardous Activities in International Law* Recueil des Cours (Brill Nijhoff, 1966); Kelson, above n 179. See also Sands and Peel, above n 97, 712. Sands and Peel suggest that strict liability for ultrahazardous activities may be a general principle of international law as this standard of care is often found in domestic law. For example, in the case of *Rylands v Fletcher* (1868) LR 3 HL 330.
[191] *Convention for Liability for Damage Caused by Space Objects*, opened for signature 29 March 1972, 961 UNTS 188 (entered into force 1 September 1972) art II.
[192] Jutta Brunnée, 'The Responsibility of States for Environmental Harm in a Multinational Context – Problems and Trends' (1993) 34(3*) Les Cahiers de droit*, 827, 839.
[193] *Vienna Convention on Civil Liability for Nuclear Damage*, opened for signature 21 May 1963, 1063 UNTS 266 (entered into force 12 November 1977) art IV.
[194] *Protocol of 1992 to amend the International Convention on Civil Liability for Oil Pollution Damage 1969*, opened for signature 27 November 1992, 1956 UNTS 255, art 4.
[195] *Protocol on Environmental Protection to the Antarctic Treaty*, opened for signature 4 October 1991, [1998] ATS 6 (entered into force 14 January 1998) annex VI art 6(3). Liability attaches to operators, including state-funded operators and commercial operators, such as tourist operators. See Sands and Peel, above n 97, 762-763.
[196] Brunnée, 'The Responsibility of States for Environmental Harm' above n 192, 839-840.
[197] See chapter 6.6.4.
[198] See ibid.
[199] Shinya Murase, 'Third report on the protection of the atmosphere', Protection of the Atmosphere, International Law Commission, 68th sess, UN Doc A/CN.4/692 (2 May-10 June and 4 July-12 August 2016), 7.

harm, states have 'two different obligations, one being the obligation to "prevent" before actual pollution or degradation occurs, and the other the duty to "eliminate", "mitigate" and "compensate" after they have already occurred.' [200] On this view, states have multiple obligations stemming from the same rule of customary international law.

This interpretation of the no-harm rule could be significant when it comes to the prevention of significant transboundary harm and/or harm to the global commons from SAI. The addition of a duty of result may encourage states not to engage in SAI if the risks cannot be sufficiently minimised. It may also encourage them to give greater consideration to alternative courses of action. For example, in the case of proposed SAI field testing, it may motivate states to more thoroughly assess whether field testing is necessary or whether similar results might be achieved by less risky means. In the case of full-scale deployment, it may encourage states to give greater consideration to conventional mitigation strategies. Failing that, the duty of result may act as an incentive for states to take greater care, beyond what is required by due diligence, to ensure that harm does not result from an attempt at SAI. [201] Therefore, while this interpretation may not be supported by state practice, it may be an important direction for the progressive development of the no-harm rule. It could bolster its capacity to contribute to the international governance of SRM geoengineering.

7.5 CONCLUSION

This chapter has considered how the no-harm rule will likely apply to future attempts at SAI. It has used three hypothetical scenarios to analyse whether SAI is likely to fall within the scope of the no-harm rule and, if so, what states must do to satisfy their obligations under this rule. It demonstrates that future attempts at SAI will likely to fall within the scope of the no-harm rule, so long as they meet the threshold of 'significant' transboundary harm. However, without a clear definition or set of objective criteria, it is difficult to tell when this threshold is likely to be reached, especially for risks of harm to the atmosphere *per se*.

Should a proposed SAI activity fall within the scope of the no-harm rule, states have a duty of due diligence to undertake their best possible efforts to prevent an attempt at SAI from causing significant transboundary harm and/or harm to the global commons. At a bare minimum, this

[200] Ibid, 8.
[201] See Sands and Peel, above n 97, 711. Sands and Peel suggest that standard of care of strict or absolute liability is more likely to encourage states 'to adopt special precautions when engaging in or permitting' dangerous activities.

would include enacting and enforcing relevant domestic law, conducting a preliminary risk assessment, conducting a full EIA, notifying and consulting with potentially affected states, and interpreting these obligations in light of the precautionary approach. It is less certain whether states may be subject to a higher standard of care for SAI. However, a higher standard of care, such as a duty of result, may remedy some of the shortcomings of a duty of due diligence and better encourage the prevention of transboundary harm and/or harm to the global commons from SAI.

Further development of the no-harm rule is required to enhance doctrinal clarity as to how it is likely to apply to future attempts at SAI. In particular, how it is likely to apply to risks of harm to the atmosphere *per se*. The likely influence of this uncertainty on compliance is explored further in the next chapter. However, this chapter demonstrates that, as it currently stands, the no-harm rule nevertheless provides a considerable level of guidance to states as to how future attempts at SAI might be conducted to prevent transboundary harm and/or harm to the global commons. For this reason alone, the no-harm rule has the potential to make an important contribution to geoengineering governance, and warrants more prominent consideration in geoengineering governance scholarship.

8 Assessing the Likelihood of Compliance with the No-Harm Rule for Future Attempts at SAI

8.1 INTRODUCTION

The previous four chapters engaged in legal doctrinal analysis of the no-harm rule and its potential application to SAI. Chapters four, five and six analysed the development of the no-harm rule through key sources to establish its content. Chapter seven applied the content of the no-harm rule to possible future attempts at SAI. Chapter seven highlighted the extent to which the no-harm rule is likely to apply to future attempts at SAI and what states would likely have to do to fulfil their obligations under this rule. This analysis suggested that, at the very least, the no-harm rule provides states with a duty of due diligence to exert their best possible efforts to prevent significant transboundary harm and/or harm to the atmosphere from future SAI proposals. Due to the nature of SAI and the risks of transboundary harm inherent to these proposals, it is also possible that states may have a higher standard of care. The only way for states to satisfy their duty of due diligence may be to *not* engage in SAI at all. Alternatively, states may have a duty of result should an attempt at SAI cause significant transboundary harm or harm to the global commons. However, as it currently stands, customary international law does not provide sufficient guidance for determining when the risks posed by SAI meet the threshold of 'significant' harm. It is therefore difficult to assess when an SAI proposal would likely trigger obligations under the no-harm rule, especially concerning risks of harm to the atmosphere *per se*.

On its own, doctrinal analysis provides only a partial assessment of the potential of the no-harm rule to contribute to governance of SRM/SAI.[1] In order to properly assess this potential, it is not only necessary to consider whether and how the rule might apply to SAI, but also to consider the rule's practical operation. That is, whether the rule will likely influence the behaviour of states when it comes to future attempts at SRM. Doctrinal analysis does not address this type of question.[2] It implicitly assumes that customary international law rules will influence the behaviour of states and other actors because they are legally binding.[3] As noted

[1] See chapter 3.2.
[2] See chapter 3.
[3] Brian D Lepard, *Customary International Law- A New Theory with Practical Applications* (Cambridge University Press, 2010) 99. See also Harold Hongju Koh, 'Why Do Nations Obey International Law?' (1997)

in chapter three, doctrinal analysis provides a framework for analysing what the law is (in a conceptual sense) and how it might apply to a particular problem. However, doctrinal analysis does not theorise how international law might actually shape the behaviour of states.[4]

The purpose of this chapter is therefore to go beyond doctrinal analysis and assess whether the no-harm rule is likely to influence the behaviour of states if they decide to attempt SAI in the future. In other words, this chapter considers the extent to which the no-harm rule is likely to *promote* compliance from states. In chapter three, it was established that the no-harm rule is most likely to influence the behaviour of states in the context of future attempts at SAI through non-utilitarian behavioural mechanisms. Specifically, through a 'logic of appropriateness'[5] and by influencing the identity and role of state actors.[6] In order to assess the capacity of the no-harm rule to influence the behaviour of states through these mechanisms, this project therefore turns to the latest theoretical development in international law and compliance theory: Brunnée and Toope's theory of interactional international law.[7]

Interactional international law is a theory of 'legal obligation'. As explained in chapter 3, legal obligation is a sense of legal legitimacy and a commitment to upholding the law.[8] Brunnée and Toope suggest that legal obligation accounts for the way in which legal norms contribute to international governance in a horizontal system without centralised enforcement mechanisms.[9] Brunnée and Toope draw on constructivist international relations (IR) theory and Lon Fuller's[10] theory of procedural natural law to explain the role of legal obligation and how it can be created and maintained to promote compliance with international law. According to interactional law theory, legal obligation is established and maintained by three key elements. The first element is shared understandings. That is, there needs to be widely shared understandings between actors concerning the need for normativity and the role or object of

106 *Yale Law Journal* 2599, 2608; Daniel Bodansky, 'The who, what, and wherefore of geoengineering governance' (2013) 121(3) *Climatic Change* 539, 542.

[4] See Terry Hutchinson, 'Doctrinal Research- Researching the Jury' in Dawn Watkins and Mandy Burton (eds), *Research Methods in Law* (Routledge, 2013) 726, 10, 15-16.

[5] James G March and Johan P Olsen, 'The Institutional Dynamics of International Political Orders' (1998) 52(4) *International Organization* 943, 951-952.

[6] Oran R Young and Marc A Levy, 'The Effectiveness of International Environmental Regimes' in Oran R Young (ed), *The Effectiveness of International Environmental Regimes* (Massachusetts Institute of Technology, 1999) 1, 23-24, 25-26. In the terminology of Young and Levy, these are the behavioural mechanism models of 'regimes as bestowers of authority' and 'regimes as role definers'. See chapter 3.3.2.

[7] Jutta Brunnée and Stephen J Toope, *Legitimacy and Legality in International Law: An Interactional Account* (Cambridge University Press 2010), 7 ('*Legitimacy and Legality*').

[8] Ibid, 7.

[9] Ibid, 6, 20.

[10] Lon L Fuller, *The Morality of Law- Revised Edition* (Yale University Press, 1969).

the specific legal norm in question.[11] The second element, drawing closely from Fuller, is comprised of eight 'criteria of legality', as previously identified in his seminal work on domestic law, the *Morality of Law*.[12] Fuller claimed that these 'criteria of legality' are internal characteristics of law that promote 'fidelity' (i.e. adherence) to law.[13] Brunnée and Toope adapt Fuller's eight criteria to international law. The third and final element is a continuing practice of legality.[14] That is, the activities and practices of international actors must be congruent with an existing legal norm and uphold and reinforce the criteria of legality.[15] According to interactional law theory, legal norms that meet these three are elements 'legitimate', will generate a strong sense of legal obligation, and 'pull' states towards compliance.[16]

Before continuing, it is important to clarify how interactional law theory is used in this project. Brunnée and Toope have applied interactional law theory retrospectively to analyse development of the law in the issue areas of climate change, torture and use of force.[17] In contrast, this project takes a more forward-looking and purposive approach to using interactional law theory. This chapter analyses the no-harm rule against the three elements of interactional law theory to establish its capacity to promote a sense of legal obligation among states and, hence, the likelihood that states will comply with it if they consider attempting SAI in the future. It is also important to note that the elements of shared understandings, criteria of legality and practice of legality are not mutually exclusive and to a certain extent are interrelated. Although this chapter attempts to addresses each element separately, some repetition of key concepts and issues is unavoidable in applying this theory. This repetition has been kept to a minimum. In applying interactional law theory to the no-harm rule, this project takes a critical approach to this theory. As noted in chapter 3, interactional international law is a relatively new theory that has not been widely considered or applied by legal or IR scholars (aside from Brunnée and Toope themselves).[18] This project considers the utility of this

[11] Brunnée and Toope, *Legitimacy and Legality*, above n 7, 80. See also Jutta Brunnée and Stephen J. Toope, 'Interactional international law: an introduction' (2011) 3(2) *International Theory* 307, 309-310 ('*Interactional International Law*'); Emanuel Adler, *Communitarian International Relations: The Epistemic Foundations of International Relations* (Routledge, 2005) 22.
[12] Fuller, above n 10.
[13] Ibid, 96.
[14] Brunnée and Toope, *Legitimacy and Legality*, above n 7, 15.
[15] Brunnée and Toope, *Interactional International Law*, above n 11, 313.
[16] See Brunnée and Toope, *Legitimacy and Legality*, above n 7, 53.
[17] Ibid, 17.
[18] The exception to this are several articles that discuss interactional international law theory published in a special edition of *International Theory* in 2011 (volume 3 issue 2). See Martti Koskenniemi, 'The mystery of legal obligation' (2011) 3(02) *International Theory* 319; Jeffrey L. Dunoff, 'What is the purpose of international law?' (2011) 3(2) *International Theory* 326; Christian Reus-Smit, 'Obligation through practice' (2011) 3(02) *International Theory* 339.

approach for analysing the way in which the no-harm rule, as a principle of customary international law, might influence the behaviour of states. Finally, the primary aim of this chapter is to assess the prospects of state compliance with the no-harm rule. However, interactional law theory acknowledges a broader range of actors in international relations.[19] Unlike the previous chapter, which only considered state actors, this chapter therefore also considers the role of non-state actors in contributing to building and maintaining the sense of legal obligation in the way states respond to the no harm rule.

8.2 SHARED UNDERSTANDINGS AND THE NO-HARM RULE

This section analyses the no-harm rule against the first element of interactional law theory-shared understandings. According to Brunnée and Toope, only a basic level of shared understandings is necessary for a 'thin' version of interactional law to exist.[20] 'Thin' shared understandings can lay the foundation for 'deeper', more substantive shared understandings to grow through further interaction.[21] Interactional law theory suggests that this is best facilitated through 'communities of practice'.[22] As explained in chapter three, communities of practice are groups of international actors (state and non-state) that facilitate the development of shared understandings through shared learning and interaction between actors and structures. This section therefore considers the extent to which there is an understanding between state and non-state actors as to the need for the no-harm rule and its object.[23] It then considers the extent to which the no-harm rule is supported by a community of practice.

8.2.1 Different level of shared understandings for transboundary harm and harm to the global commons

The no-harm rule has been widely acknowledged by states, legal scholars and international courts and tribunals as a binding principle of customary international law. As noted in chapter 5, it has been reiterated by states in the *Stockholm Declaration* and *Rio Declaration*. It has also been included in the preamble or operative text of numerous multilateral environmental

[19] Brunnée and Toope, *Legitimacy and Legality*, above n 7, 77-86.
[20] Ibid, 68-69.
[21] Ibid, 81.
[22] See Etienne Wenger, *Communities of Practice: Learning, Meaning and Identity* (Cambridge University Press, 1998); Adler, above n 11.
[23] Brunnée and Toope, *Legitimacy and Legality*, above n 7, 80. ; Brunnée and Toope, *Interactional international law*, above n 11, 309-310; Adler, above n 11, 22.

agreements, including the *UNFCCC*[24], *UNCLOS*[25], and the *Ozone Convention*.[26] However, widespread acknowledgement of the no-harm rule does not necessarily mean that there is widespread shared understanding of it, particularly amongst states. As noted by Brunnée and Toope, just because a rule is formalised as customary or treaty law does not mean that is satisfies the elements of interactional law theory.[27]

Nonetheless, it is fair to say that the no-harm rule for the prevention transboundary harm to the territory of other states is supported by a reasonable level of shared understanding. This stems from the robust shared understandings of state sovereignty and the rights of sovereign states to be free from outside interference that underpin the international legal system.[28] According to Brunnée and Toope, all international legal interactions are built upon a shared understanding of the fundamental principles of state sovereignty, sovereign equality and non-intervention, and these principles 'remain the frame of reference for global legal relations.'[29] As noted in chapter 4, the no-harm rule developed as a corollary of state sovereignty.[30] Its original object was to balance the sovereign rights of states. By virtue of the strong shared understanding that exists amongst states concerning state sovereignty and state sovereign rights, states also share a common understanding of the need to prevent transboundary harm to the territory of other states.

The basis of this shared understanding is illustrated by the arguments made by Australia and New Zealand in the 1974 *Nuclear Tests* cases.[31] As explained in chapter 5, transboundary harm from radioactive fallout was a key concern. However, both states framed their arguments in

[24] *United Nations Framework Convention on Climate Change*, opened for signature 9 May 1992, 1771 UNTS 107 (Entered into force 21 March 1994) preamble ('*UNFCCC*').
[25] *United Nations Convention on the Law of the Sea*, opened for signature 10 December 1982, 1833 UNTS 3 (entered into force 16 November 1994) art 192 ('*UNCLOS*').
[26] *Vienna Convention for the Protection of the Ozone Layer*, opened for signature 22 March 1985, 1513 UNTS 293 (entered into force 22 September 1988) preamble ('*Ozone Convention*'). See also *Convention on the Prevention of Marine Pollution by Dumping of Wastes and Other Matter*, opened for signature 29 December 1972, 1046 UNTS 138 (entered into force 30 August 1975) preamble ('*London Convention*'); *Convention on Biological Diversity*, opened for signature 5 June 1992, 1760 UNTS 79 (entered into force 29 December 1993) art 3 ('*CBD*'); *Convention on Long-range Transboundary Air Pollution*, opened for signature 13 November 1979, 1302 UNTA 217 (entered into force 16 March 1983) preamble ('*LRTAP*').
[27] Brunnée and Toope, *Legitimacy and Legality*, above n 7, 75.
[28] See also Jutta Brunnée, 'The Sources of Interactional Environmental Law: Interactional Law ' in Samantha Besson and d'Aspremont (eds), *Oxford Handbook on the Sources of International Law* ((2017) Forthcoming) 1 < http://papers.ssrn.com/sol3/papers.cfm?abstract_id=2784731> 9.
[29] Brunnée and Toope, *Legitimacy and Legality*, above n 7, 71.
[30] See also, Brunnée, above n 28, 9.
[31] *Nuclear Tests Case (Australia v France) (Judgment)* [1974] ICJ Reports 253; *Nuclear Tests Case (New Zealand v France) (Judgment)* [1974] ICJ Reports 457.

terms of terms of breach of territorial sovereignty and sovereign rights. For example, Australia alleged that:

> France's activities in the South Pacific area are inconsistent with its obligation under general international law to respect the sovereignty of Australia over and in respect of its territory and thus to abstain from producing alterations of any kind in the Australian environment (atmosphere, soil, waters) by the deposition in its territory and the dispersion in its airspace of radio-active fall-out.[32]

New Zealand similarly suggested that it had a right:

> [W]hich derives from its sovereignty, to control the level of radioactivity in its territory, territorial waters and airspace or of the right not to have harm caused to it and its people as a result of the entry into those areas of radioactive debris from nuclear testing.[33]

These statements therefore suggest that Australia and New Zealand believed that transboundary radioactive fallout was a breach of their sovereign rights, *including* the right to be free from transboundary harm.

Comments made by states regarding the ILC's *Draft Articles on Prevention* provide a more recent example of how the understanding of states of the no-harm rule remains grounded in broader shared understandings of state sovereignty. France recommended that the *Draft Articles* clarify the limits of state sovereignty and state that:

> [T]he freedom of a State to carry on activities in its territory is not unlimited and that such freedom is subject to the obligation to prevent or minimize the risk of causing significant transboundary harm.[34]

Turkey further stated that:

> [T]he rules pertaining to the prevention of transboundary damage should be based on mutual understanding and respect for each State's rights, first and foremost respect for the sovereign rights of States.[35]

Shared understandings of state sovereign rights, as opposed to environmental protection, therefore continue to support the need for normativity. That is, the need for a rule to prevent transboundary harm.

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[32] 'Memorial on Jurisdiction and Admissibility Submitted by the Government of Australia' *Nuclear Tests Case (Australia v France)* [1974] ICJ Pleadings 249, 331.
[33] 'Memorial on Jurisdiction and Admissibility Submitted by the Government of New Zealand *Nuclear Tests Case (New Zealand v France)* [1974] ICJ Pleadings 145, [192].
[34] 'Comments and observations received from Governments: report of the Secretary-General', International Liability for Injurious Consequences Arising out of Acts Not Prohibited by International Law (Prevention of Transboundary Damage from Hazardous Activities), UN Doc A/CN.4/509 (17 April 2000) 127, 129.
[35] 'Comments and observations received from Governments: report of the Secretary-General', International Liability for Injurious Consequences Arising out of Acts Not Prohibited by International Law (Prevention of Transboundary Damage from Hazardous Activities), UN Doc A/CN.4/509 (17 April 2000) 127, 130.

However, the no-harm rule for the prevention of harm to the global commons does not share the same normative foundations. As the global commons exist beyond the sovereign territory of states,[36] the extended no-harm rule for the global commons is not supported by a shared understanding of state sovereignty and state rights. The no-harm rule for the global commons instead developed out of growing concern for the global environment.[37] As previously explained in chapter 5, such concern led to the reiteration of the no-harm rule in principle 21 of the *Stockholm Declaration* and principle 2 of the *Rio Declaration*. Both declarations are widely supported by states and demonstrate a formal 'aspiration' to prevent harm to the global environment.[38] However, once again, the extension of the no-harm rule to the global commons in these declarations does not automatically mean there is a strong shared understanding amongst states as to the need for the rule and its object.

Actions may speak louder than words when assessing the shared understanding of states to protect the global commons from harm. Brunnée and Toope suggest that in some instances, shared understandings may be more accurately demonstrated through the physical actions of states rather than in verbal statements or pledges, such the support of international agreements.[39] In analysing shared understandings concerning the prohibition against torture prior to September 11 2001, Brunnée and Toope noted that, the majority of states had ratified relevant treaties in support of this norm, but, when confronted with significant threats to national security, states either ignored or directly sanctioned the use of torture.[40] According to Brunnée and Toope, the contradiction between state support for the prohibition of torture and actual practice suggest that:

> [T]he real shared understanding was that torture was wrong, but sometimes necessary, and would be tactically supported by state authorities, especially if the torture could be kept secret.[41]

In other words, a lack of congruent practice with a posited norm may indicate a weak (or entirely different) shared understanding.

This also appears to be the case with the prevention of harm to the global commons. Congruent practice with the no-harm rule is considered in greater detail below in 8.4.8, as one of Fuller's criteria of legality. This issue is therefore examined in more detail below. For the purpose of the element of shared understandings, suffice it to say that there is a widespread lack of

[36] See chapter 7.3.1.
[37] See chapter 5.
[38] See Brunnée and Toope, *Legitimacy and Legality*, above n 7, 232.
[39] Ibid, 232-233.
[40] Ibid, 232.
[41] Ibid, 233.

congruence between the no-harm rule and the actions of state with regards to preventing harm to the global commons. Despite the fact that the no-harm rule for the global commons is formally recognised as part of customary international law, states continue to engage in or endorse activities that harm the global commons, including pollution of the marine environment of the high seas and the atmosphere. Prominent contemporary examples include greenhouse gas emissions causing climate change, atmospheric pollution from forest fires in Indonesia,[42] marine plastics pollution in the high seas[43] and harm to the marine environment of the high seas by China as identified by the Permanent Court of Arbitration in the *South China Sea* Arbitration.[44] The contradiction between the no-harm rule for the global commons as formally posited and the actual behaviour of states therefore suggests that there is a fragile shared understanding between states regarding this norm.

Stronger shared understandings may exist among non-state actors. The efforts of environmental NGO's to protect the environment of global commons area, such as Greenpeace International[45] and the World Wildlife Fund[46], implicitly support the no-harm rule for the prevention of harm to the global commons. Furthermore, over 6,000 organisations, including NGOs and international organisations, have endorsed the Earth Charter.[47] This is a global civil society initiative launched on the 29 June 2000.[48] The need to prevent harm to the global environment and adopt a precautionary approach is recognised under principle 6.[49] This indicates widespread support amongst non-state actors for operation of the no-harm rule to prevent significant harm to the global commons.

Interactional law theory recognises the role of a diverse range of actors in building and maintaining shared understandings, including NGOs and civil society.[50] In this sense, Brunnée and Toope do not explicitly privilege the understandings of states over other actors. However,

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[42] See Allen L Springer, *Cases of Conflict: Transboundary Disputes and the Development of International Environmental Law* (University of Toronto Press, 2016) 54-83.
[43] See, eg, Ljubomir Jeftic, Seba Sheavly, and Ellik Adler, *Marine Litter: A Global Challenge*, United Nations Environment Program, April 2009, < http://www.unep.org/Regionalseas/marinelitter/publications/docs/Marine_Litter_A_Global_Challenge.pdf>; Michelle Allsopp et al, *Plastic Debris in the World's Oceans*, Greenpeace International, 2 November 2006, < http://www.unep.org/regionalseas/marinelitter/publications/docs/plastic_ocean_report.pdf>;
[44] *The South China Sea Arbitration (Philippines v China) (Awards)* (Permanent Court of Arbitration, Case No 2013-19, 12 July 2016) [815]-[993].
[45] See *Bountiful Oceans*, Greenpeace International <http://www.greenpeace.org/international/en/campaigns/oceans/>.
[46] See *Climate*, WWF <http://www.wwf.org.au/what-we-do/climate>.
[47] See *What is the Earth Charter?*, Earth Charter Initiative < http://earthcharter.org/discover/what-is-the-earth-charter>.
[48] Ibid.
[49] *The Earth Charter*, Earth Charter Initiative, <http://earthcharter.org/discover/the-earth-charter>.
[50] Brunnée and Toope, *Legitimacy and Legality*, above n 7, 84-86.

given that states remain the primary actors in international law and the no-harm rule is directed at the behaviour of states, this research argues that there must be a widespread shared understanding between states for the no-harm rule to promote amongst them a strong sense of legal obligation.

8.2.2 Communities of practice

This project similarly argues that it is important for states to be involved in a community of practice around the no-harm rule. According to interactional law theory, communities of practice are necessary to develop deeper and more substantive shared understandings of legal norms.[51] Communities of practice bring state and non-state actors together to share ideas and develop new shared understandings through mutual engagement and social learning.[52] Brunnée and Toope state that 'it is only when new actors, be they states, international organizations or non-state actors, become actively engage in a community of practice that its understandings come to be more widely shared (and, possibly, again re-shaped).'[53] By this reasoning, if states are to develop deeper shared understandings of the no-harm rule (especially for the global commons) they must actively participate in a community of practice.

The concept of communities of practice in international relations as posited by Adler is sufficiently broad to accommodate the interaction of state and non-state actors in a wide ranges of circumstances.[54] As noted in chapter three, communities of practice are not international actors in their own right, but co-exist and overlap with them.[55] According to Adler, they might include 'communities of diplomats, of traders, of environmentalists, and of human rights activists.'[56] However, Brunnée and Toope suggest that communities of practice are more likely to develop around treaty bodies and formal institutions. They state that:

> These spaces include international intergovernmental organizations, treaty regimes embedded in institutions such as conferences of the parties, treaty implementation mechanisms including compliance procedures, conferences that include state and other international actors, intergovernmental and non-governmental networks, expert and advocacy groups that promote norms and monitor implementation, and transnational media. Dense communities of practice are more likely to arise in situations where there is relatively institutionalized and sustained legal interaction.[57]

[51] Ibid, 62-65. See also chapter 3.
[52] Ibid, 64.
[53] Ibid.
[54] See Adler, above n 11.
[55] Ibid, 15-16.
[56] Ibid, 15.
[57] Brunnée and Toope, *Legitimacy and Legality*, above n 7, 356.

Brunnée and Toope highlight how a community of practice of state and non-state actors has developed around the *UNFCCC*.[58] This includes civil society, business organisations, universities and religious organisations.[59] They note that, while these various actors often pursue different objectives, they nevertheless 'share a collective understanding of the enterprise they are engaged in and why it is important.'[60] Brunnée and Toope demonstrate how the procedural dimensions of the *Kyoto Protocol* and *UNFCCC*, including regular COP meetings and inventory and reporting commitments, provided state and non-state actors with space and opportunities to frequently interact.[61]

It is possible to identify actions by state and non-state actors that contributes towards a practice of legality for the no-harm rule. This third element of interactional law theory is examined in greater detail below. Key examples include international litigation in which states and international courts and tribunals contribute to a practice of legality by debating and enforcing the no-harm rule.[62] Similarly, international organisations contribute to a practice of legality by campaigning for the application and/or progressive development of the no-harm rule, especially in the context of climate change damage.[63] This project however argues that, while it is possible to identify actions that support a *practice of legality*, this does not necessarily mean there is a *community of practice* for the no-harm rule.

It is challenging to identify a community of practice for the no-harm rule for transboundary harm or harm to the global commons that involves both state and non-state actors, *and* involves sustained and mutual interaction between them. As a principle of customary international law, there is no treaty body to facilitate *mutual* interaction between state and non-state actors as in the above *UNFCCC* example. Moreover, while individual examples of practice can be identified, it does not amount to a community of practice to facilitate *interactive* lawmaking. Take the example of international litigation and the recent *Certain Activities* case.[64] Costa Rica

[58] Ibid, 142-146.
[59] Ibid, 142.
[60] Ibid, 143-144.
[61] Ibid, 194-204.
[62] Brunnée, above n 28, 10.
[63] See Roda Verheyen and Peter Roderick for WWF-UK, *Beyond Adaptation: The legal duty to pay compensation for climate change damage* (November, 2008). This report was also supported by Oxfam and the Stockholm Environment Institute (see acknowledgements in report). See also International Law Association, *Declaration of Legal Principles relating to Climate Change*, Resolution 2/2014, (76th Conference of the International Law Association 7-11 April 2014) Draft Article 7; *'No-harm rule' and climate change: briefing paper*, Legal Response Initiative: Lawyers Responding to Climate Change, (24 July 2012) < http://legalresponseinitiative.org/legaladvice/no-harm-rule-and-climate-change/>.
[64] *Certain Activities Carried Out by Nicaragua in the Boarder Area (Costa Rica v Nicaragua) & Construction of a Road in Costa Rica Along the San Juan River (Nicaragua v Costa Rica) (Judgment)* (International Court of Justice, General List No 150 & 152, 16 December 2015).

and Nicaragua considered the meaning of the no-harm rule in the context of the dispute.[65] In turn, the ICJ expressed its view on the no-harm rule. The ICJ's decision will undoubtedly give rise to academic discussion concerning the content no-harm rule (this project being one such example). According to Brunnée and Toope, for a community of practice to exist, actors must engage in *specific* types of interaction to a *sufficient* degree. [66] Such types of interactions include 'sustained mutual relationships… shared approaches to interaction, shared indicators of membership, knowledge of others and their roles in the joint enterprise, shared discourses and shortcuts to communication, and common criteria for the appropriateness of actions and outcomes.'[67] By this account, international litigation is too episodic[68] and restricted in its participants (including state and non-state actors)[69] to give rise of a community of practice around the no-harm rule.

The work of international organisations also has not lead to sustained and mutual interaction between state and non-state actors regarding the no-harm rule. A key example here is the work of the International Law Commission its *Draft Articles on the Prevention of Transboundary Harm* ('*Draft Articles on Prevention'*).[70] In the *Draft Articles on Prevention*, the ILC sought to promote a specific and detailed understanding of the content of the no-harm rule. In this sense, the ILC can be described as attempting to act as a 'norm entrepreneur'.[71] However, the interpretation promoted by the ILC does not appear to have been widely embraced by states. As demonstrated by the submissions of Colombia in the *Aerial Herbicide Spraying* case, not all states recognise the ILC *Draft Articles on Prevention* as an authoritative interpretation of customary international law.[72] The reluctance of some states to engage with the ILC's *Draft Articles on Prevention* is further demonstrated through the UN General Assembly. Since the

[65] See Chapter 6.6.
[66] Brunnée and Toope, *Legitimacy and Legality*, above n 7, 70.
[67] Ibid, 70 n 70.
[68] International litigation may stimulate some interaction around the no-harm rule, but only on an *ad hoc* basis when disputes arise. Interaction between the Parties and the court or tribunal is also a one-way process. After the court or tribunal hands down its decision, engagement between parties and the court or tribunal typically ends.
[69] Aside from the jurists or arbitrators themselves, the only actors that may formally participate in international litigation are states. NGO's and other non-state actors such as non-governmental organisations are not formally included in proceedings before most international courts and tribunals. See Ulrich Beyerlin, 'The Role of NGOs in International Environmental Litigation' (2001) 61 *Heidelberg Journal of International Law* 357, 357-357. According to Beyerlin, NGOs typically do not have standing before international courts, including the ICJ and the ITLOS. An exception is the European Union Court of Justice, where they may have standing in very limited circumstances. Beyerlin also notes that the ICJ and ITLOS are 'very reluctant' to acknowledge NGOs as *amicus curiae* in contentious proceedings (at 363-364).
[70] 'Draft Articles on Prevention of Transboundary Harm from Hazardous Activities, with Commentaries' (2001) II(2) *Yearbook of the International Law Commission*, 149 ('*Draft Articles on Prevention*').
[71] Brunnée and Toope, *Legitimacy and Legality*, above n 7, 57. See also Martha Finnemore and Kathryn Sikkink, 'International Norm Dynamics and Political Change' (1998) 52(4) *International Organization* 887, 896.
[72] See chapter 6.5.1.

Draft Articles on Prevention were finalised in 2001, the UN General Assembly has called on multiple occasions for states to give further consideration to them in light of the ILC's recommendation that they form the basis of an international convention. In resolution 65/28 of 2010 and 68/114 of 2013, the UN General Assembly commended the *Draft Articles on Prevention* to the attention of states, and invited governments to comment on their form and content.[73] So far, states have not taken up this invitation. This lack of engagement with the *Draft Articles on Prevention* suggests that states are reluctant to endorse and legitimise this interpretation of the no-harm rule. Moreover, these examples suggest that the *Draft Articles on Prevention* have not encouraged states to mutually deliberate and further engage with the content of the no-harm rule. They therefore have not led to a widespread community of practice around the no-harm rule.

The absence of a community of practice does not necessarily prevent the no-harm rule from generating a sense of legal obligation, but it may mean that deeper, more substantive understandings concerning the no-harm rule are unlikely to develop amongst state and non-state actors. This is a considerable issue for the no-harm for the prevention of harm to the global commons, which is not already supported by a 'thin' level of shared understandings. It also means that state and non-state actors are less likely to resolve (or work to resolve) substantive aspects the no-harm rule that are currently ambiguous and limit its capacity to respond to the risks of SAI. For example, the relevant standard of care and the threshold level of 'significant' harm. Interactional law theory suggests that a widespread community of practice involving both state and non-state actors is therefore needed to further develop the no-harm rule in a manner that is perceived by state and non-state actors as socially legitimacy and will contribute to the sense of legal obligation generated by this rule.

Nonetheless, creating a widespread community of practice for the no-harm rule may be easier said than done. As mentioned above, Brunnée and Toope privilege the role of international institutions in facilitating sustained, mutual interaction between state and non-state actors and the creation of communities of practice. This vision of communities of practice is relatively straightforward to conceptualise and apply in the context of treaty-based norms. But it is much more difficult to reconcile with norms of customary international law which, by their very

[73] *Consideration of prevention of transboundary harm from hazardous activities and allocation of loss in the case of such harm*, GA Res 65/28, UN GAOR, 6th Comm, 65th sess, Agenda Item 81, Un Doc A/RES/65/28 (6 December 2010); *Consideration of prevention of transboundary harm from hazardous activities and allocation of loss in the case of such harm*, GA Res 68/114, UN GAOR, 6th Comm, 68th sess, Agenda Item 83, Un Doc A/RES/68/114 (18 December 2013).

nature, lack formal institutions and mechanisms. This project therefore flags this aspect of interactional law theory for future consideration and development. Greater guidance is needed to understand how communities of practice might be identified and/or built around norms of customary international law.

8.3 FULLER'S EIGHT CRITERIA OF LEGALITY

This section analyses the no-harm rule against Fuller's eight criteria of legality. According to Brunnée and Toope, shared understandings provide the necessary social foundations for legal norms, but in order for interactional law to develop there must also be a sustained practice of legality which is 'rooted in Fuller's eight criteria of legality'.[74] As noted in chapter three, these criteria are: (1) Generality (2) Promulgation (3) Retroactivity (4) Clarity (5) Contradiction (6) Impossibility (7) Constancy and (8) Congruence. The main focus of this section is to assess the no-harm rule against each criterion. However, this assessment is not wholly unconnected from the other two elements of interactional law theory. To a certain extent, Fuller's criteria of legality overlap with shared understandings and the practice of legality. As noted by Brunnée and Toope:

> Fuller's criteria of legality are not a mere checklist to tell us whether or not a particular legal form, e.g. treaty or a court decision, is properly designed as 'law'. Instead, the criteria come alive when actors reason with the rules in continuing processes of mutual engagement, creating a community of *legal* practice.[75] (emphasis added)

The criteria of legality therefore connect with the other two elements of interactional law theory.

8.3.1 Generality

Fuller's first criterion of generality is straightforward: there must be a rule that applies to a general class of persons.[76] Brunnée and Toope have expanded on Fuller's description, stating that there must be a rule that prohibits, requires or permits certain conduct.[77] The no-harm rule requires states to take measures to prevent significant transboundary harm and harm to the global commons. Brunnée and Toope further clarify that to meet the criterion of generality, a rule must 'not address only one case, but apply in principle to all.'[78] In other words, it should apply equally to all relevant actors and scenarios. Brunnée and Toope suggest that universal

[74] Brunnée and Toope, *Legitimacy and Legality*, above n 7, 86.
[75] Ibid, 86.
[76] Fuller, above n 10, 46.
[77] Brunnée and Toope, *Legitimacy and Legality*, above n 7, 26.
[78] Ibid, 301.

application of a rule or regime strongly contributes to its legitimacy and a sense of legal obligation because all states have the same rule applied to them and share an equal interest in how the rule is maintained and developed.[79] The no-harm rule applies universally to the activities of all states.[80] The no-harm rule appears therefore satisfies the criterion of generality.

8.3.2 Promulgation

The no-harm rule meets Fuller's second criterion of legality, which is promulgation. According to Fuller, law should be made generally available to those subject to it.[81] This is so the subjects of the law know in advance what the law is and can critique and reason with the law.[82] Brunnée and Toope suggest that the expression of international legal norms in formal sources plays a crucial role in international law:

> [B]y telling the world that the norm is seen by the actors in the system as a legal norm. They are a communicative device that signals the potential existence of an obligation and that also allows people to know prima facie what they are required to do or refrain from doing'[83]

As a principle of customary international law, the no-harm rule is not as readily accessible as laws contained in international agreements. However, the no-harm rule has been reiterated by international courts and tribunals and the *Stockholm* and *Rio* Declarations. Therefore, while it is not promulgated in the same way as a treaty text, it has nevertheless been well communicated to states. If a state should decide to attempt SAI in the future, it would undoubtedly be aware of the no-harm rule.

8.3.3 Non-Retroactivity

The third criterion of legality is that laws should not be made retroactive.[84] The no-harm rule may not have met this criterion when it was first articulated by the arbitral tribunal in the *Trail Smelter* arbitration. As explained in chapter four, the Tribunal predominantly drew on analogous cases between states within the US federation to articulate this rule.[85] The extent to which the Tribunal's pronouncement reflected customary international law at that time is questionable. Nevertheless, since the *Trail Smelter* arbitration, the no-harm rule for transboundary harm to states has been recognised as customary international law. The no-harm rule for harm to the global commons has been recognised as custom since the 1996 *Nuclear*

[79] Ibid, 178.
[80] See Ibid, 301.
[81] Fuller, above n 10, 49-51.
[82] Ibid, 51.
[83] Brunnée and Toope, *Legitimacy and Legality*, above n 7, 279.
[84] Fuller, above n 10, 51-62.
[85] Chapter 4.2.2.

Weapons advisory opinion.[86] Should a state decide to attempt SAI in the future, there would be no issue of retroactive application of the no-harm rule for transboundary harm or harm to the global commons.

8.3.4 Clarity

The no-harm rule has difficulties meeting Fuller's fourth criterion of clarity. This criterion requires that actors are able to 'understand what is permitted, prohibited or required by the law.'[87] A key issue in this regard is the threshold level of 'significant' harm. As explained in chapter seven, whether an activity meets this threshold is currently determined on a case-by-case basis. This may be less challenging for risks of transboundary harm that have been recognised in previous decisions of international courts and tribunals.[88] In certain circumstances it may be obvious that an activity poses a risk of significant harm. For example where an activity involves highly toxic or radioactive substances.[89] However, to use the words of Brunnée and Toope, this is a 'common sense' type approach to establishing severity of harm that amounts to nothing more than a 'legal 'I know it when I see it' test'.[90] This type of approach is flexible and enables the no-harm rule to respond to a wide range of scenarios. Yet, it also means that the threshold level of harm is unclear and open to wide interpretation, especially in the context of harm to the global commons.[91]

The absence of a clear definition of 'significant' harm creates uncertainty and space for actors to promote their own definitions. This issue overlaps with the element of shared understandings. Brunnée and Toope examined this phenomenon in relation to the prohibition on torture. The key element that defines 'torture' under the *Convention against Torture and Other Cruel, Inhuman or Degrading Treatment or Punishment* is 'severe pain or suffering'.[92] According to Brunnée and Toope, what qualifies as 'severe pain or suffering' is unclear, and this lack of clarity combined with a fragile shared understanding created space for the US Government under the G.W. Bush administration to redefine torture and create exceptions to the prohibition on the basis of necessity and national security.[93] The US Government sought to

[86] *Legality of the Threat or Use of Nuclear Weapons (Advisory Opinion)* [1996] ICJ Rep 226.
[87] Brunnée and Toope, *Legitimacy and Legality*, above n 7, 251.
[88] Chapter 7.3.3.
[89] Catherine Redgwell, 'Transboundary pollution: principles, policy and practice ' in S Jayakumar et al (eds), *Transboundary Pollution: Evolving Issues of International Law and Policy* (Edward Elgar, 2015) 11, 15.
[90] Brunnée and Toope, *Legitimacy and Legality*, above n 7, 252.
[91] See chapter 7.3.3.
[92] *Convention against Torture and Other Cruel, Inhuman or Degrading Treatment or Punishment*, opened for signature 26 June 1987, 1465 UNTS 113 (entered into force 26 June 1987) art 1.
[93] Brunnée and Toope, *Legitimacy and Legality*, above n 7, 233-256.

redefine torture in such a way as to permit interrogation techniques such as waterboarding that did not cause 'severe' physical harm.[94] The lack of clarity as to what amounted to 'severe pain or suffering' also influenced the element of shared understandings. According to Brunnée and Toope, it created a window for the US to act as a norm entrepreneur to seek to build new shared understandings as to what behaviour was prohibited by this rule.[95] This project suggests that the key element of 'significant' harm under the no-harm rule is similarly unclear. This may create an opportunity for norm entrepreneurs to fill this gap with their own understanding of 'significant' harm.

Early attempts at norm-entrepreneurial activity can already be seen within geoengineering scholarship. Prominent researchers are promoting certain understandings as to what might qualify as an 'acceptable' level of side effects (or risk therefore) from SAI proposals. This is demonstrated by calls to progress to 'small-scale' SAI field testing.[96] Proponents claim that field testing is needed to reduce uncertainty concerning the benefits and risks of SAI.[97] It has also been suggested that so long as field tests are conducted below a certain scale, they will not have any measurable climatic impacts, especially not on a global scale.[98] For example, Parson and Keith propose that a threshold might be established based on the 'area, duration and size of radiative forcing perturbation' of a proposed SAI field test, below which field testing might be deemed acceptable by governments.[99] The scientific validity of these claims has been challenged by other scientists in the field.[100] However, regardless of their scientific validity, these claims 'share a common supposition that small-scale testing should proceed even in the absence of further international agreement.'[101] In this sense, arguments in favour of small-scale

[94] See ibid, 239.
[95] Ibid, 352.
[96] See, eg, David W. Keith, Edward Parson and M. Granger Morgan, 'Research on global sun block needed now' (2010) 463(7280) *Nature* 426; Edward A Parson and David W Keith, 'End the Deadlock on Governance of Geoengineering Research' (2013) 339(6125) *Science* 1278; John A Dykema et al, 'Stratospheric controlled perturbation experiment: a small-scale experiment to improve understanding of the risks of solar geoengineering' (2014) 372(2031) *Philosophical Transactions of the Royal Society of London A: Mathematical, Physical and Engineering Sciences* 1; Douglas G. MacMynowski et al, 'Can we test geoengineering?' (2011) 4(12) *Energy & Environmental Science* 5044. Cf Stefan Schafer et al, 'Field tests of solar climate engineering' (2013) 3(9) *Nature Clim. Change* 766; Alan Robock et al, 'A Test for Geoengineering?' (2010) 327(5965) *Science* 530.
[97] See, eg, Keith, Parson and Morgan, above n , 426; Jane C S Long, Frank Loy and M Granger Morgan, 'Start research on climate engineering ' (2015) 518(7537) *Nature* 29.
[98] See MacMynowski et al, above n 96, 5045. See also Parson and Keith, above n 96; Keith, Parson and Morgan, above n 96.
[99] Parson and Keith, above n 96, 1279.
[100] See Robock et al, above n 96. Robock et al argue that in order for an SAI field test to produce measureable results it would have to be conducted on a large scale akin to full scale deployment. They propose that field testing would have to be conducted on a large enough scale and for a long enough period of time to distinguish the impacts of SAI from natural weather and climate variability. See also Schafer et al, above n 96.
[101] Schafer et al, above n 96, 766.

field testing represent early attempts by actors within the geoengineering community to construct shared understandings as to what types and scales of SAI deployment would be 'acceptable' to states and, hence, would not require governance at an international level.

The majority of these claims do not directly engage with or acknowledge the no-harm rule.[102] Nevertheless, by developing a shared understanding of what level of geoengineering is internationally acceptable they could indirectly bear on how the no-harm rule is to be interpreted to apply to future attempts at SAI. Suggestions that international governance is not needed for SAI below a certain scale of activity implicitly assume that the act of creating reflective particles in the atmosphere, and the extent and magnitude of any related side effects, would automatically be tolerated by other states. If such suggestions were to gain enough momentum, it is possible that they could be co-opted to determine when a proposed SAI activity gives rise to international legal obligations under the no-harm rule. For this reason, greater decision-making parameters are needed to help determine when an activity meets the threshold of 'significant' harm.

Clarity is also an issue when it comes to interpreting procedural obligations in the context of harm to the global commons. As noted in chapter seven, states have a duty to notify and consult with other potentially affected states for activities that pose a risk of significant transboundary harm. However, it is unclear how this obligation translates to harm to the global commons.[103] This issue also intersects with the criterion of impossibility discussed further below.

8.3.5 Contradiction

The fifth criterion of legality is contradiction. That is, one law should not contradict or prevent compliance with another law.[104] The no-harm rule conflicts with the concept of absolute state sovereignty. During the 19th Century, states were considered to have an absolute sovereign right to act as they wished within their own territory. This doctrine of absolute sovereignty is known as the 'Harmon Doctrine'.[105] However, this doctrine has long since been overturned in

[102] See, eg, Parson and Keith, above n 96, 1278. Parson and Keith state that 'geoengineering outside national territory—from small field research to operational deployment—falls under no international legal control.'
[103] Chapter 7.4.1.
[104] See Fuller, above n 10, 65-66.
[105] This name stems from a statement made by US Attorney General Judson Harmon in relation to a waterway dispute between the US and Mexico over the Rio Grande. See Judson Harmon, 'Treaty of Guadalupe Hidalgo-International Law', (1898) 21 *Opinions of the Attorney General*, 274. In Harmon's opinion, the US was not obliged under the rules of international law to limit its use of the waters of the Rio Grande to ensure that enough water was left to flow downstream to state of Mexico (at 280-281). See also Stephen C McCaffrey, 'The Harmon Doctrine One Hundred Years Later: Buried, Not Praised' (1996) 36 *Natural Resources Journal* 549,

favour of an understanding of state sovereignty that is qualified by the obligation to protect the rights of other states. This is evident in the decision of the Permanent Court of International Justice in the *Island of Palmas* case, which held that:

> Territorial sovereignty… involves the exclusive right to display the activities of a State. This right has as corollary a duty: the obligation to protect within the territory the rights of other States, in particular their right to integrity and inviolability in peace and in war, together with the rights which each State may claim for its nationals in foreign territory.[106]

The rights of states under the doctrine of state sovereignty are therefore no longer understood to be absolute. The no-harm rule upholds this understanding of state sovereignty and therefore meets the criterion of non-contradiction.

8.3.6 Impossibility

The sixth criterion of legality is that the law should be realistic and not demand the impossible of its subjects.[107] The duty of due diligence provided by the no-harm rule does not demand the impossible of states. As noted in chapter seven, this duty in inherently flexible, accommodating different risks and also potentially the capabilities and capacities of states.[108] In the context of transboundary harm, the procedural obligations flowing from this duty cannot be said to be overly onerous or unrealistic. The duty of due diligence therefore does not demand the impossible in this context.

However, as noted above, the procedural obligations that flow from the duty of due diligence are not so straightforward when it comes to harm to the global commons. In particular, the duty to notify and consult with potentially affected states. Not only does this issue detract from the clarity of the no-harm rule, but it may also raise the issue of impossibility. As mentioned in chapter seven, it could be argued that as a global commons, all states share an equal interest in the protection of the atmosphere.[109] However, it would be highly onerous if states were to individually notify and consult with *all* other states for activities that pose a risk of significant harm to the global commons. Until this obligation is further clarified, it may be impossible for states to satisfy it in the context of harm to the global commons.

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551. According to McCaffrey, the statements of Harmon have since become ‘synonymous with the doctrine of absolute territorial sovereignty.’

[106] *Island of Palmas (Netherlands v United States)(Awards)* (1928) 2 RIAA 829, 839.

[107] See Brunnée and Toope, *Legitimacy and Legality*, above n 7, 300, 310.

[108] Chapter 7.4.1.

[109] See Neil Craik, 'International Law and Geoengineering: Do Emerging Technologies Require Special Rules?' (2015) 5(2-4) *Climate law* 111, 136.

Given the nature of SAI, states may have a duty of result (i.e. 'strict liability') under the no-harm rule.[110] It is therefore also important to consider if this would satisfy the criterion of impossibility. A duty of result would arguably be more onerous on states as they would be required to ensure that no significant transboundary harm results from any future attempts at SAI, regardless of fault. Fuller considered the possibility that strict liability norms demand the impossible. He notes that '[i]t is sometimes assumed that no form of legal liability can be justified unless it rests either on (1) an intent to do a harmful act, or (2) some fault or neglect.' In other words, it is easy to assume that obligations of result demand the impossible as they may hold an actor to account for a result that they had no intention of creating, nor any ability to influence.

However, according to Fuller, this does not mean that strict liability 'demands the impossible' in accordance with this criterion.[111] Fuller gives examples of instances in which strict liability is justifiable and does not detract from the 'inner morality' of law. His arguments concerning strict liability for risky activities are of most relevance to the no-harm rule. Fuller suggests that strict liability for risky activities is justified as the true purpose of such rules is not to prohibit hazardous activities, but instead to attach a special kind of liability to them.[112] In Fuller's words 'enterprises creating special risks ought to bear the cost of injuries resulting from their operation'.[113] When viewed in this light, a duty of result under the no-harm rule for SAI would not demand the impossible: it would merely shift responsibility for harm onto the state under whose control SAI is being conducted.

8.3.7 Constancy/Predictability

The seventh criterion of legality is constancy. According to Fuller, laws should not change too frequently over time.[114] As demonstrated in chapters four, five and six, the content of the no-harm rule has evolved over the past seventy years. However, key shifts in the content of the no-harm rule, such as its extension to the global commons, have been relatively infrequent.

[110] See chapter 7.4.2.
[111] Fuller, above n 10, 71-75.
[112] Ibid, 75. Fuller uses the example of blasting operations to illustrate this point. He states that due to the nature of such operations 'no amount of care or foresight can prevent occasional unintended injury.' If the operator of such a risky enterprise was only held accountable for harm caused by fault they would have little incentive to take extra care in the blasting activities. Fuller describes strict liability in this scenario as a 'kind of tax in the form of a rule that he must respond for any kind of damage that results from these operations, whether or not they can be attributed to any negligence'. The law should not be interpreted as 'commanding the man using the explosives never to cause any damage, however innocently. Rather we should regard the rule as attaching a special liability to entry upon a certain line of conduct.'
[113] Fuller, above n 10, 75-76.
[114] Ibid, 79.

Other developments, such as the recognition of procedural obligations, are better described as refinements rather than 'changes' to the no-harm rule. That is, they have spelt out the content of the no-harm rule in greater detail, as opposed to changing it entirely. The no-harm rule therefore meets Fuller's understanding of constancy.

However, Brunnée and Toope have a more expansive understanding of this criterion. They suggest that this criterion not only requires constancy in the law but also predictability.[115] That is, actors should be able to predict with a reasonable degree of accuracy when and how the law is to be applied. [116] Once again, the threshold of 'significant' transboundary harm poses an issue. It is challenging to determine with a reasonable degree of certainty when an activity such as SAI is likely to trigger the no-harm rule as there are no set decision-making parameters for determining when this threshold is met.[117]

8.3.8 Congruence

Fuller's eighth criterion of legality is that there must be congruence between official actions and posited law.[118] In the words of Brunnée and Toope, lawmaking is not a 'one-way street' in that the actions of those responsible for making and/or enforcing the law must uphold and comply with the law.[119] Compliance with law is not merely a desired outcome, but part of the ongoing process of interactive lawmaking.[120] In international law, states are responsible for making the law *and* are subject to it.[121] States are also responsible for enacting and enforcing domestic law to uphold their international commitments. Therefore, in order to analyse whether the no-harm rule meets Fuller's eighth criterion of congruence, it is necessary to look at the behaviour and practice of states and their officials with regard to this rule.

Legal scholars have long recognised that there is a lack of congruence between the no-harm rule and the practice of states. According to Schachter:

> To say that a state has no right to injure the environment of another seems quixotic in the face of the great variety of transborder environmental harms that occur every day. Many result from ordinary economic and social activity; others occur by accident, often unrelated to fault.[122]

[115] Brunnée and Toope, *Legitimacy and Legality*, above n 7, 281-282.
[116] Ibid, 281-282.
[117] Ibid, 327.
[118] Fuller, above n 10, 81. Brunnée and Toope, *Interactional International Law*, above n 11, 311.
[119] Brunnée and Toope, *Legitimacy and Legality*, above n 7, 7.
[120] Ibid, 7, 122.
[121] Ibid, 40. See also Brunnée and Toope, Interactional International Law, above n 11 312.
[122] Oscar Schachter, 'The emergence of international environmental law' (1991) 44(2) *Journal of International Affairs* 457, 463.

Bodansky further notes that 'transboundary pollution seems much more the rule than the exception in interstate relations.'[123] These statements are general reflections and are not based on detailed empirical analysis. However, numerous examples of transboundary pollution readily come to mind in support of these statements. Recent examples include: the 2000 Baia Mare Cyanide Spill;[124] the 2009 Montara oil spill;[125] the 2010 Deepwater Horizon oil spill;[126] the 2011 Fukushima nuclear disaster;[127]; the ongoing issue of the transboundary movement of smog from China over parts of South Korea and Japan;[128] and China's failure to protect and preserve the marine environment in the *South China Sea* Arbitration.[129] The *South China Sea Arbitration* is the only one of these examples where an international court or tribunal has established a breach of due diligence on behalf of a state. Still, the regularity with which transboundary harm and harm to the global commons occurs suggests that states are not taking sufficient preventative measures. Given this regularity, it is beyond the scope of this research to provide a detailed examination of every instance of transboundary pollution or harm to the global commons. Instead, three prominent examples are illustrated below: the 1986 Chernobyl nuclear disaster, the ongoing Indonesian haze problem and ongoing issue of anthropogenic climate change.

The 1986 Chernobyl nuclear disaster is commonly cited as an example of state practice that is incongruent with the no-harm rule. When the nuclear reactor exploded, it released a radioactive

[123] Daniel Bodansky, 'Customary (and Not So Customary) International Environmental Law ' (1995) 3 *Indiana Journal of Global Legal Studies* 105, 110-111.
[124] See Springer, above n 42, 84- 106. Cyanide from a gold mine in Romania entered shared river systems and crossed into Hungary, Serbia and Bulgaria.
[125] Oil from an Australian offshore oil field in the Timor Sea spilled into Indonesian waters, allegedly resulting in harm to local fish stocks and seaweed crops. See Jewel Topsfield, 'Indonesian government poised to sue over Montara oil spill', *Sydney Morning Herald*, 14 October 2015, <http://www.smh.com.au/world/indonesian-government-poised-to-sue-over-montara-oil-spill-20151014-gk8mz4.html>.
[126] The Deepwater Horizon mobile oil rig caught fire and exploded, causing an estimated 4.9 million barrels of oil to leak into the Gulf of Mexico, impacting on marine life and causing damage to coastal states in the region. See Rebecca K Richards, 'Deepwater Mobile Oil Rigs in the Exclusive Economic Zone and the Uncertainty of Coastal States, (2011) 10 *Journal of International Business & Law* 387, 392-394.
[127] Radioactive waste from the crippled nuclear power plant in Japan has leaked into the Pacific Ocean, and has been detected as far as California and British Columbia. See Ken Buesseler, '5 years later, Fukushima radiation continues to seep into the Pacific Ocean', *PBS Newshour*, 9 March 2016, <http://www.pbs.org/newshour/updates/fukushima-radiation-continues-to-leak-into-the-pacific-ocean/>.
[128] See, http://www.taipeitimes.com/News/front/archives/2013/02/05/2003554261; Laura S Henry, Jasper Kim and Dongho Lee, 'From Smelter Fumes to Silk Road Winds: Exploring Legal Responses to Transboundary Air Pollution over South Korea' (2012) 11(3) Washington University Global Studies Law Review 565.
[129] *The South China Sea Arbitration (Philippines v China) (Awards)* (Permanent Court of Arbitration, Case No 2013-19, 12 July 2016) [815]-[993]. See also Joshua Paine, *Environmental Aspects of the South China Sea Award*, EJIL: Talk! (21 July 2016) < http://www.ejiltalk.org/environmental-aspects-of-the-south-china-sea-award/>.

plume high into the atmosphere.[130] As a result, many European countries were contaminated by radioactive fallout from the disaster.[131] Affected states also had to bear the cost of trying to mitigate the damage to their territory, including damage to agricultural, fishing and tourist industries.[132] The widespread transboundary damage caused by the Chernobyl nuclear disaster indicates a lack of congruence between the actions of the Soviet Union and the no-harm rule. Mover, the Soviet Union failed to warn potentially affected states of the disaster until 2 days after the explosion.[133] Its officials had also been negligent in operating the reactor.[134] This suggests that the Soviet Union did not satisfy its duty of due diligence to prevent significant transboundary harm. Nevertheless, affected states did not bring a claim against the Soviet Union for breaching its obligation under customary international law.[135] The Soviet Union also did not pay compensation to affected states.[136]

A more recent example of incongruent state practice is the issue of transboundary haze pollution in South East Asia. Smoke haze is an ongoing problem in the region due to land clearing.[137] In 1997 and 1998, deliberately lit fires in Indonesia spread across the provinces of Kalimantan and Sumatra, producing thick smoke haze that affected Thailand, Singapore, Malaysia and Australia.[138] The haze especially affected the health of citizens living in Singapore and Malaysia and had a detrimental impact on tourism in these states.[139] The fires also had a direct impact on the atmosphere. A report by the Asian Development Bank states the burning of peat bog in the region alone was estimated to have released more than 700 million megatons of carbon dioxide into the atmosphere.[140] It is also questionable whether Indonesia met the necessary standard of due diligence prior to the outbreak of the fires. In 1995,

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[130] John Howard, 'Chernobyl Nuclear Disaster' in *Encyclopedia of Quantitative Risk Analysis and Assessment* (John Wiley & Sons, Ltd, 2008) < http://onlinelibrary.wiley.com/doi/10.1002/9780470061596.risk0554/abstract> 1.
[131] Ibid, 1. See also Philippe J Sands, 'The Environment, Community and International law ' (1989) 30(2) *Harvard International Law Journal* 393, 402.
[132] Ibid, 403.
[133] See Richard E Levy, 'International Law and the Chernobyl Accident: Reflections of an Important but Imperfect System ' (1987-1988) 36 *Kansas Law Review* 81, 82.
[134] Four Soviet ministerial officials were fired for gross negligence that allegedly led to the explosion. See Celestine Bohlen, 'Soviets Cite Negligence at Chernobyl', The Washington Post, 20 July 1986 <https://www.washingtonpost.com/archive/politics/1986/07/20/soviets-cite-negligence-at-chernobyl/64d3ac3f-547d-46ad-aa17-6c5c043df27d/>.
[135] Sands, above n 131, 407.
[136] See ibid.
[137] See S.Tahir Qadri (ed), *Fire, Smoke, and Haze: The ASEAN Response Strategy* (2001) Asia Development Bank < https://openaccess.adb.org/bitstream/handle/11540/307/fsh.pdf?sequence=1 > xiii.
[138] Springer, above n 42, 62.
[139] Ibid, 54, 61-62.
[140] Qadri, above n 137, 48.

the Indonesian government banned the use of fire for land clearing.[141] However, according to Springer, Indonesia's capacity to monitor land clearing activities in the affected regions was constrained as '[p]oorly coordinated national agencies faced tight budgets and limited presence in the regions where the fires were being set.'[142] It therefore could not and did not effectively enforce the ban.[143]

Despite suffering hundreds of million dollars' worth of damages and the potential lack of diligence on behalf of the Indonesian government, Singapore and Malaysia did little to suggest that Indonesia had breached its obligations under the no-harm rule.[144] Furthermore, neither state sought compensation for damages.[145] Springer states that the governments of Singapore and Malaysia were largely cooperative in their response to the situation. Instead of insisting that Indonesia was legally responsible for the fires and subsequent harm caused, they instead expressed concern for Indonesia and offered to help respond to the fires.[146] As with the Chernobyl nuclear disaster, the governments of Singapore and Malaysia did not seek to invoke the no-harm rule.[147]

The 1997/1998 fires led to the negotiation of the 2002 *ASEAN Agreement on Transboundary Haze Pollution*.[148] The objective of the agreement is to 'prevent and monitor transboundary haze pollution as a result of land and/or forest fires which should be mitigated, through concerted national efforts and intensified regional and international co-operation.'[149] The no-harm rule was incorporated under article 3(1). Indonesia did not ratify the agreement until 14 October 2014.[150] Prior to its ratification, there was a fresh outbreak of fires in Indonesia in 2013 that resulted again in hazardous levels of air pollution over Singapore and Malaysia.[151] Indonesia accepted responsibility and formally apologised for the fires.[152] However, once again, Singapore and Malaysia did not strongly emphasise that Indonesia was obliged under

[141] David B Jerger Jr, 'Indonesia's Role in Realising the Goals of ASEAN's Agreement on Transboundary Haze Pollution ' (2014) 14(1) *Sustainable Development Law & Policy* 35, 36.
[142] Springer, above n 42, 58.
[143] Jerger Jr, above n 141, 36. See also Springer, above n 42, 58.
[144] Springer, above n 42, 54.
[145] Ibid.
[146] Ibid, 64.
[147] Ibid, 64-65.
[148] Jerger Jr, above n 141, 40. *ASEAN Agreement on Transboundary Haze Pollution*, opened for signature 10 June 2002 (entered into force 25 November 2003) available at <http://haze.asean.org/asean-agreement-on-transboundary-haze-pollution/> ('*ASEAN Haze Agreement*').
[149] *ASEAN Haze Agreement*, above n , art 2.
[150] *Status of Ratification*, Haze Action Online, (20 January 2015) <http://haze.asean.org/status-of-ratification/>.
[151] Jessica Schechinger, 'The 2013 Southeast Asia haze- a shared responsibility?' SHARES , 30 October 2013, < http://www.sharesproject.nl/the-2013-southeast-asia-haze-a-shared-responsibility/ > .
[152] 'Indonesian President Susilo Bambang Yudhoyono apologises for haze, *BBC News*, 25 June 2014, <http://www.bbc.com/news/world-asia-23026599>.

customary international law to ensure that activities in its jurisdiction and control do not cause transboundary harm. Nor did they claim compensation for harm under the doctrine of state responsibility.

In the Chernobyl nuclear disaster and the ongoing issue of Indonesian haze pollution, government officials on both sides of the fence appear to have acted incongruently with the no-harm rule. First, accounts suggest that the states responsible for the harm failed to act diligently. That have also not sought to remedy harm caused through compensation. Second, and perhaps more significantly, the injured states have also failed to uphold the no-harm rule by not invoking or enforcing it against the perpetrating state. According to Brunnée and Toope, failure to enforce a legal norm can also indicate 'a lack of 'congruence' between existing norms and international practice.'[153] The failure of states to invoke or enforce the no-harm rule includes the no-harm rule for the global commons. Both scenarios involve harm to the global commons in addition to transboundary harm. Specifically, atmospheric pollution and, in the case of Indonesian fires, threats to biodiversity.[154] However, as mentioned above, there are no clear secondary rules or legal mechanisms for states to bring proceedings for harm to the global commons. It is therefore unsurprising that states (including those not affected by transboundary harm) also did not seek to invoke any collective rights regarding the protection of the environment *per se*.[155]

It could be argued that the Chernobyl disaster and the issue of transboundary haze from Indonesia are exceptional examples of state behaviour. After all, they are only two examples of transboundary harm and harm to the global commons. They also only involve a handful of states. Given the nature of the no-harm rule it is much easier to pinpoint examples of incongruent practice as opposed to compliance. Arguably, there would be less prominent, unpublicised examples in which states have acted diligently and taken all necessary steps to prevent harm from being caused. However, there are other international environmental issues that demonstrate incongruent state practice on a much larger scale, suggesting that the behaviour of states with regards to Chernobyl and the Indonesian Haze dispute is indicative of a broader trend.

[153] Brunnée and Toope, *Legitimacy and Legality*, above n 7, 113.
[154] See Springer, above n 42, 69-70.
[155] See, ibid, 69-70; Sands, above n 131, 407. At the time Sands was writing, the ICJ was yet to reformulate the no-harm rule for the environment and the global commons in the Nuclear Weapons advisory opinion. Sand's argument largely focuses on the lack of international law to address environmental harm *within* the territory of a state. Nevertheless, his arguments are equally applicable in the context of pollution of the atmosphere from radioactive particles.

The most prominent example of widespread incongruent practice is anthropogenic climate change. States have recognised the cause of climate change and the risks of harm it poses for over twenty years. This is marked by the *UNFCCC*, which was negotiated by states in 1992 to respond to climate change. The no-harm rule is enshrined within the preamble to the *UNFCCC*. However, despite the negotiation of the *UNFCCC* and subsequent agreements under this regime, states have not taken necessary action to prevent significant harm from climate change by sufficiently reducing their greenhouse gas emissions. Many states remain dependant on fossil fuels for their transportation and stationary energy needs. Moreover, experts suggest that the Intended Nationally Determined Contributions that states have set for themselves under the 2015 *Paris Agreement* are insufficient to prevent the rise in global mean surface temperatures from exceeding the critical limit of two degrees Celsius above pre-industrial levels.[156] The recent election of Donald Trump as the 45th President of the United States appears likely to compound this issue, as Trump has indicated the US will withdraw from the *Paris Agreement*.[157] The current action on behalf of states therefore appears to be insufficient to meet the 1.5-2 °C target under the *Paris Agreement* and prevent dangerous levels of climate interference and the associated impacts this is likely to have on the territory of other states and global commons areas.

Some risks of transboundary harm and harm to the global commons have already materialised. For example, rising global mean surface temperatures are causing sea levels to rise, resulting in extensive coastal erosion and threatening the existence of small island developing states, such as the Maldives and Kiribati.[158] The rising level of carbon dioxide in the atmosphere is altering the pH level of the oceans, causing them to become more acidic and impacting on marine ecosystems.[159] As noted above, the idea of invoking the no-harm rule as a basis for

[156] See *The Emissions Gap Report 2016: A UNEP Synthesis Report* (United Nations Environment Program, 2016) xiv- xviii; Joeri Rogelj et al, 'Paris Agreement climate proposals need a boost to keep warming well below 2 °C' (2016) 534(7609) (06/30/print) *Nature* 631.

[157] See, eg, Coral Davenport, 'Diplomats Confront New Threat to Paris Climate Pact: Donald Trump', *New York Times*, 18 November 2016, < http://www.nytimes.com/2016/11/19/us/politics/trump-climate-change.html?_r=0>; Luke Kemp, 'President Trump could kill the Paris Agreement – but climate action will survive', *The Conversation*, 11 November 2016 < https://theconversation.com/president-trump-could-kill-the-paris-agreement-but-climate-action-will-survive-68596>.

[158] See, eg, *Coastal Erosion*, Kiribati Climate Change, <http://www.climate.gov.ki/category/effects/coastal-erosion/>; 'Kiribati looks to artificial islands to save nation from rising sea levels', *ABC News*, 17 February 2016, <http://www.abc.net.au/news/2016-02-17/artificial-islands-perhaps-the-only-option-to-save-kiribati/7175688>; Dunya Maumoon, 'We should not surrender to climate change', *The Guardian*, 2 27 January 2015, <https://www.theguardian.com/environment/2015/jan/27/should-not-surrender-climate-change-sea-level-rise-maldives>.

[159] Alex Rogers, 'Global Warming's evil twin: ocean acidification', The Conversation, 9 October 2013 <https://theconversation.com/global-warmings-evil-twin-ocean-acidification-19017>. What is ocean acidification?, *NOAA*, <http://www.pmel.noaa.gov/co2/story/What+is+Ocean+Acidification%3F>

climate change litigation has been mooted by NGOs and academics. It has also been considered by a small number of vulnerable states.[160] However, generally speaking, obligations to prevent transboundary harm and harm to the global commons under the no-harm rule have taken a backseat to cooperation and negotiation within the UNFCCC regime.[161] In this sense, climate change demonstrates widespread incongruence between the no-harm rule and the actions of states.

8.3.9 Conclusion on criteria of legality

The extent to which the no-harm rule meets Fuller's criteria of legality is summarized in the following table:

Figure 8.1 The degree to which the no-harm rule meets Fuller's criteria of legality

Criterion	**No-harm rule for transboundary harm**	**No-harm rule for the global commons**
1. Generality	*High*	*High*
2. Promulgation	*Medium-High*	*Medium-High*
3. Non-Retroactivity	*High*	*High*
4. Clarity	*Medium*	*Low*
5. Contradiction	*High*	*High*
6. Impossibility	*Medium-High*	*Medium*
7. Constancy/Predictability	*Medium*	*Low*
8. Congruence	*Low*	*Low*

Figure 8.1 suggests the no-harm rule for transboundary harm meets five of Fuller's eight criteria of legality to medium-high to high degree. It meets the criteria of clarity and constancy to a medium degree as previous decision of international courts and tribunals provide some

[160] See Stuart Beck and Elizabeth Burleson, 'Inside the System, Outside the Box: Palau's Pursuit of Climate Justice and Security at the United Nations' (2014) 3(01) *Transnational Environmental Law* 17.
[161] See Benoît Mayer, 'The relevance of the no-harm principle to climate change law and politics ' (2016) 19 *Asia Pacific Journal of Environmental Law* 79, 81-85. See also Beck and Burleson, above n 160. Beck and Burleson examine two initiatives on behalf of the small Pacific Island developing state of Palau to encourage action on climate change outside the *UNFCCC* regime.

guidance on what might be considered significant transboundary harm. However, based on the examples analysed above, the no-harm rule for transboundary harm only meets the criterion of congruence to a low degree.

By contrast, the no-harm rule for the global commons only satisfies four out of eight criteria to a medium-high to high degree. The difficulty in translating the procedural obligation to notify and consult means that it only satisfies the criterion of impossibility to a medium degree. The key differences however are the criteria of clarity and constancy/predictability, which are only satisfied to a low degree owing to the fact that states have an overly generous discretion to recognise when an activity poses a risk of significant' harm to the global commons. The no-harm rule for transboundary harm therefore meets the criteria of legality to a greater degree that the no-harm rule for harm to the global commons.

This research has assessed each criteria on a scale, because there is some room for flexibility in Fuller's approach. Fuller states that the extent to which a law must meet each of the eight criteria will depend on the type of rule in question.[162] For example, he states that 'it is generally more important that a man have a clear warning of his legal duties than that he should know precisely what unpleasantness will attend a breach'.[163] Therefore, in Fuller's view, rules do not necessarily have to meet every criteria to a high degree in order to qualify as 'law'. However, Fuller suggests that a 'total failure' of a law to meet any one of these eight criteria means that a rule does not qualify as law 'except perhaps in the Pickwickian sense in which a void contract can still be said to be one kind of contract.'[164] The no-harm rule for transboundary harm does not qualify as 'law' in Fuller's theory, as it does not sufficiently meet the criteria of congruence. The no-harm rule for harm to the global commons also falls short on account of the criteria of clarity and constancy/predictability.

Brunnée and Toope echo Fuller's view that the criteria of legality are 'conditions for the existence of law.'[165] However, it is important to remember how these criteria fit within the bigger picture of interactional law theory. They are one of three elements that contribute to the creation of interactional law and the cultivation of a sense of legal obligation amongst actors. Furthermore, as explored below, realisation of the criteria of legality is part of an ongoing process. In this sense, failure to meet a criterion of legality may not absolutely prevent a rule

[162] Fuller, above n 10, 93.
[163] Fuller, above n 10, 93.
[164] Ibid, 39.
[165] See Brunnée and Toope, *Legitimacy and Legality*, above n 7, 41.

from promoting a sense of legal obligation, but it may weaken this sense and, hence, the compliance pull it would likely have on states.

8.4 PRACTICE OF LEGALITY

The third element of interactional law theory is practice of legality. Practice of legality overlaps with Fuller's criterion of congruence. [166] This is because a strong practice of legality requires congruence between law and official action.[167] However, the element of practice of legality requires more than mere congruence with a posited norm. [168] According to Brunnée and Toope, in order for legal norms to generate a strong sense of legal obligation there must also be:

> [A] sustained and continuous effort to realize all the criteria of legality. This is not to say that practice must be absolutely consistent with the criteria of legality for legal rules to be created an upheld: but, recurring failures to meet the various criteria will ultimately erode, and even destroy, law.[169]

Practice must therefore also include efforts to meet the criteria of legality. In other words, there must also be 'norm application' in addition to compliance. [170] This includes legal argumentation, interpretation and enforcement of legal norms.[171]

It is through the element of practice of legality that interactional law theory comes full-circle. According to Brunnée and Toope, efforts to meet the criteria of legality are best facilitated by building spaces and opportunities for ongoing interaction between state and non-state actors. That is, it is best facilitated by the creation of communities of practice that promote inclusive and transparent lawmaking processes.[172] In this regard, the element of practice of legality also interrelates with the first element of shared understandings.

Given the extent to which practice of legality overlaps with the element of shared understandings and the criteria of legality, the analysis in this section is relatively brief. In this chapter, it has already been established that there is a widespread lack of congruence between the practice of states and the no-harm rule. This is not merely demonstrated by incidences of transboundary harm and harm to the global commons. It is also demonstrated by a failure of states to invoke and/or enforce the no-harm rule. According to Brunnée and Toope, incongruent

[166] See ibid, 259.
[167] Ibid.
[168] Ibid, 283.
[169] Ibid, 283-284.
[170] Brunnée, above n 28, 7.
[171] Ibid. See also Brunnée and Toope, *Legitimacy and Legality*, above n 7, 111.
[172] Brunnée and Toope, *Legitimacy and Legality*, above n 7, 124, 353.

practice coupled with a failure to enforce a rule significantly detracts from the capacity of a legal norm to promote a sense of legal obligations. They state that

> [W]hen significant instances of non-complacence by one or more actors meet with no, or only selective, responses – when the community of practice does not insist that its rules are obeyed – international law will come under increasing strain.[173]

In this view, the failure of states to invoke and/or enforce the no-harm rule in numerous circumstances detracts from the capacity of the no-harm to promote compliance. This is because enforcement plays a greater role than merely coercing states to comply with international law.[174]

In interactional law theory, enforcement is instead seen as an activity that makes an important contribution to the practice of legality, and hence, legal obligation. It also contributes to the requirement for norm application and efforts to realise Fuller's criteria of legality. In her own interactional international law analysis of the no-harm rule, Brunnée suggests there has recently been a 'renaissance' regarding the practice of neighbouring states and the no-harm rule.[175] She highlights the *Pulp Mills* case, *Aerial Herbicide Spraying* case and the *Certain Activities* case. As contentious cases, they contribute to practice of legality. Each case involved argumentation, interpretation and/or enforcement of the no-harm rule. However, these three examples must be weighed against the numerous instances in which the no-harm rule was not argued, interpreted and/or enforced, such as the Chernobyl nuclear disaster, Indonesian haze dispute and climate change damage examined above. They suggest that any such 'renaissance' in the application of the no-harm rule may not be sufficiently widespread (even in the context of neighbouring states) to generate a strong sense of legal obligation.

It is also important to note that there a fewer examples of practice of legality for the no-harm rule for the global commons compared to transboundary harm. Argumentation and interpretation of the no-harm rule is largely isolated to legal scholarship. The ILC did not address the issue of harm to the global commons when developing its *Draft Articles on Prevention.*[176] The ILC has begun to consider the no-harm rule in its new project on the *Protection of the Atmosphere*. However the mandate of this project will likely prevent the ILC from interpreting and/or applying the no-harm rule to key issues such as climate change.[177]

[173] Ibid, 113-114.
[174] Ibid, 111-114, 124.
[175] Brunnée, above n 28, 10.
[176] Chapter 7.3.1.
[177] See *Analytical guide to the work of the international law commission: Protection of the Atmosphere: Mandate*, International Law Commission (18 November 2016) <http://legal.un.org/ilc/guide/8_8.shtml>. See also Mayer, above n 161, 84.

The no-harm rule as a principle of customary international law has been considered in *obiter* in the *Nuclear Weapons* advisory opinion, the *Activities in the Area* advisory opinion, and the 2016 *South China Sea* arbitration, but it has not been the subject of a contentious case. Moreover, there are no clear mechanisms for states to commence such cases and give rise to greater practice in the future.[178] The no-harm rule for the global commons therefore has a much weaker practice of legality than the no-harm rule for transboundary harm.

8.5 LEGAL OBLIGATION

The above sections have considered in detail the extent to which the no-harm rule meets the elements of shared understandings, criteria of legality and practice of legality. What does this mean overall for the capacity of the no-harm rule to promote a sense of legal obligation in the context of future attempts at SAI? In order to reflect on this analysis, these results are summarised in the following table:

Figure 8.2 Elements of interactional law theory

Element	**No-harm rule for transboundary harm**	**No-harm rule for harm to the global commons**
Shared Understandings	*Medium-High*	*Low-Medium*
Criteria of Legality	*Medium*	*Low-Medium*
Practice of Legality	*Low-Medium*	*Low*

It is important to keep in mind that interactive lawmaking is an ongoing process, rather than an endpoint. Brunnée and Toope's analysis of the climate change regime, the prohibition against torture and the prohibition against the use of force illustrates that the extent to which norms will meet the elements of interactional law theory will wax and wane over time. Legal obligation is a variable concept. It does not merely *exist* (in an 'all or nothing' sense). Instead, legal obligation is *built*, and must be cultivated and maintained.[179] Furthermore, Brunnée and Toope suggest that the extent to which a norm is perceived as legitimate will affect the extent

[178] This is discussed further in chapter 9.
[179] Brunnée and Toope, *Legitimacy and Legality*, above n 7, 98.

to which it is complied with.[180] In this view, the capacity of the no-harm rule to promote a sense of legal obligation and compliance pull over states in the context of SAI reflects the extent to which it satisfies the elements of interactional law theory.[181]

This research suggests that there is considerable room for legal obligation to be further cultivated and maintained for the no-harm rule in the context of transboundary harm. The no-harm rule for transboundary harm could better meet Fuller's criteria of clarity, constancy/predictability and congruence. Practice of legality also needs to be bolstered to enhance the rule's capacity to promote a sense of legal obligation in this context. Nevertheless, the no-harm rule for the prevention of transboundary harm satisfies the elements of interactional law theory to a greater extent than the no-harm rule for the prevention of harm to the global commons. It is therefore likely to promote a stronger sense of legal obligation and, hence, exert a greater compliance pull over states for risks of transboundary harm from SAI. Conversely, the no-harm rule is likely to promote a weaker sense of legal obligation in the context of risks of harm to the global commons from SAI. The capacity of the no-harm rule to pull states towards compliance will therefore be lessened in the context of risks of harm to the global commons from SAI. Interactional law theory therefore suggests that state compliance with the no-harm rule for future attempts at SAI can be expected to differ depending on the nature of the risks involved.

The application of interactional law theory consequently provides a different perspective on the capacity of the no-harm rule to contribute to the governance of SAI than doctrinal legal analysis. Doctrinal legal analysis in chapter seven provided an understanding of how the no-harm rule *should* apply to SAI and what types of behaviour it would require and/or prohibit from states if they should decide to pursue SAI in the future. On the other hand, interactional law theory indicates the extent to which the no-harm rule is likely to achieve these objectives by influencing the behaviour of states through a sense of legal obligation and the logic of appropriateness. In this sense, it provides a unique perspective on the no-harm rule compared to what can otherwise be found in legal scholarship.

Analysing the no-harm rule through the lens of international law theory also provides a unique perspective on how this rule might be further developed to better contribute to the governance

[180] Ibid, 99. Brunnée and Toope agree with Thomas Franck, who states that 'the extent to which a rule is cognizable as a legitimate obligation affects the extent to which it is obeyed.' See Thomas M Franck, *The Power of Legitimacy Among Nations* (Oxford University Press, 1990) 44.
[181] See Brunnée and Toope, *Legitimacy and Legality*, above n 7, 99.

of SAI. Brunnée and Toope describe interactional law theory as providing 'concrete guidance in seizing opportunities for effective law-making'.[182] The above analysis does this by explaining *how* and *why* the capacity of the no-harm rule to promote compliance from states may be limited. It provides states, policymakers and international lawyers with targeted information on how the no-harm rule might be developed to improve this capacity. Some of the issues highlighted in this analysis overlap with issues identified by doctrinal legal analysis (i.e. the issue of 'significant' harm). However, other issues are distinct to interactional law theory, such as the need for a community of practice for the no-harm rule. Taking an interactive approach to the no-harm rule therefore provides a more nuanced picture of the role of the no-harm rule in international environmental governance and highlights additional pathways for the development of the no-harm rule to enhance this role.

Nonetheless, it is important to remember that, as a theoretical lens, there are a number of issues that interactional law theory does not consider. As highlighted in chapter three, Brunnèe and Toope recognise that power and material interests continue to play a role in determining compliance with international law,[183] but the elements of interactional law theory do not provide a means to consider how utilitarian considerations might interplay with legal obligation. This research used the work of Young and Levy to rule out the likely influence of utilitarian considerations in the specific context of SAI.[184] However, such considerations may carry greater weight in the context other activities that pose a risk of transboundary harm and/or harm to the global commons.

Interactional law theory provides a lens for considering how legal norms function as *law* by promoting a sense of legal legitimacy, legal obligation and compliance pull. It does not provide a lens for considering the *substantive* effectiveness of the no-harm rule. That is, how effectively the no-harm rule would solve or resolve the international environment issues posed by SAI. Furthermore, interactional law theory does not provide a framework to consider whether the no-harm rule promotes a 'just' or 'equitable' means to govern the risks of SAI, and how these considerations might influence compliance. Such considerations are largely beyond the scope of this project. However, they may be important to consider in future research to further enhance understanding of the role of the no-harm rule in international environmental governance.

[182] See Brunnée and Toope, *Legitimacy and Legality*, above n 7, 17.
[183] See chapter 3.3.1; Brunnée and Toope, *Legitimacy and Legality*, above n 7, 93.
[184] Chapter 3.3.2.

8.6 CONCLUSION

This chapter has used interactional law theory to analyse the potential of the no-harm rule to promote a sense of legal obligation and compliance pull from states if they should attempt SAI in the future. This analysis suggests that the no-harm rule is likely to promote a greater sense of legal obligation for risks of transboundary harm, rather than risks of harm to the global commons. It therefore somewhat likely that states will comply with the no-harm rule in the context of transboundary harm. However, an interactional approach suggests that it is improbable that states will feel a strong sense of legal obligation to comply with the no-harm rule when it comes to risks of harm to the global commons.

This conclusion is alarming, given the risks of harm to the atmosphere posed by SAI. It suggests that the capacity of the no-harm rule to respond to these risks is inadequate. This stands in stark contrast to the status of the extended no-harm rule as a binding rule of customary international law. The following chapter therefore considers how the no-harm rule might be developed to enhance its capacity in this regard.

9 Synthesis: Developing the No-Harm Rule for the Global Commons

9.1 INTRODUCTION

This project has taken two different approaches to analysing the potential of the no-harm rule to contribute to the governance of SAI. Chapters four to seven analysed the no-harm rule using legal doctrinal analysis. These chapters provided a detailed account of the historical development and current state of the no-harm rule, and how it is likely to apply to future attempts at SAI. Chapter eight used interactional law theory to assess the extent to which the no-harm rule is likely to promote a sense of legal obligation and, hence, how likely it is to pull states towards compliance should they consider attempting SAI.

This chapter draws on the findings of doctrinal legal analysis and interactional law theory to consider the overall capacity of the no-harm rule to contribute to SAI governance, now and into the future. These findings suggest that, in its current form, the no-harm rule is better placed to respond to risks of transboundary harm from SAI proposals than risks of harm to the global commons. This is not to say that the no-harm rule necessarily provides an *adequate* means of governing risks of transboundary harm from SAI. The no-harm rule as it currently stands does not provide a panacea in this regard. However, this research demonstrates that it is currently in a better position to contribute to the governance of SAI in the context of transboundary harm compared to risks of harm to the global commons.

Given the nature of SAI and the risks of harm it poses to the atmosphere, this project has argued there is a greater need to develop the no-harm rule to prevent significant harm to the global commons, than for transboundary harm. This chapter thus makes four recommendations to states, international organisations, and international law scholars for how they might develop the no-harm rule for the global commons. These are: (1) build a community of practice between state and non-state actors; (2) develop a set of criteria to assist states and decision-makers to determine when an activity poses a risk of significant harm to a global commons area; (3) clarify the means by which states can enforce the no-harm rule for the global commons; and (4) clarify how procedural obligations under the no-harm rule are to be interpreted in the context of the global commons. These developments would bolster the capacity of the no-harm rule to contribute to the governance of SAI by reducing doctrinal ambiguity and enhancing the

sense of legal obligation that states feel to comply with the no-harm rule. These developments would not necessarily transform the no-harm rule into a comprehensive governance regime for SAI, because key issues, including the practicalities of establishing a breach for the purpose of state responsibility or liability,[1] would remain outstanding. These recommendations would however, bring the capacity of the no-harm rule to prevent significant harm to the global commons on par with its capacity to prevent transboundary harm. This would equip international law with a basic capacity to govern risks of significant harm to the global commons posed by SAI until such a time as a comprehensive international agreement might be negotiated and would strengthen the no-harm rule to respond to other activities that pose a risk of significant harm to the global commons.

This chapter proceeds as follows. Section 9.2 considers the overall capacity of the no-harm rule to respond to the risks of SAI. Section 9.3 proposes how the no-harm rule might be developed to enhance its capacity to contribute to respond to activities that pose a risk of significant harm to the global commons. Section 9.4 concludes by offering final observations on the potential of the no-harm rule to contribute to the international governance of SRM.

9.2 THE CURRENT CAPACITY OF THE NO-HARM RULE TO RESPOND TO SAI

Figure 9.2 below summarises the findings from chapters seven and eight. It illustrates the extent to which the content of the no-harm rule might apply to future attempts at SAI. This includes the extent to which it is clear that SAI will fall within the scope of the no-harm rule, and the extent to which obligations of states under the no-harm rule might be understood in this context. These findings are contrasted against the extent to which the no-harm rule meets the three elements of interactional law theory.

[1] See chapter 2.3. See also David Reichwein et al, 'State Responsibility for Environmental Harm from Climate Engineering' (2015) 5(2-4) *Climate law* 142; Barbara Saxler, Jule Siegfried and Alexander Proelss, 'International liability for transboundary damage arising from stratospheric aerosol injections' (2015) 7(1) *Law, Innovation and Technology* 112.

Figure 9.2 Findings of doctrinal legal analysis and interactional law theory

		Transboundary Harm	Harm to the Global Commons
Doctrinal legal analysis			
Scope:	Transboundary impact	Clear	Moderately clear
	Nature of harm (detrimental + from a physical act)	Clear	Moderately clear
	Threshold level of 'significant' harm	Moderately unclear	Unclear
Standard of Care:	Duty of due diligence	Moderately unclear	Moderately unclear
	Enact and enforce domestic law	Moderately clear	Moderately clear
	Initial assessment of risk	Moderately clear	Moderately clear
	Environmental impact assessment	Moderately unclear	Moderately unclear
	Notify and consult	Clear	Unclear
	Precautionary approach	Moderately clear	Moderately clear
Interactional law theory			
	Shared understandings	*Medium-High*	*Low-Medium*
	Criteria of legality	*Medium*	*Low-Medium*
	Practice of legality	*Low-Medium*	*Low*

The two different approaches taken to analysing the no-harm rule in this project make similar findings concerning its capacity to respond to the risks of SAI. They both demonstrate that the no-harm rule is better placed to respond to risks of transboundary harm than harm to the global commons. In the case of doctrinal legal analysis, it is clearer to interpret and apply the no-harm rule to risks of transboundary harm. It is relatively straightforward to determine if a proposed SAI activity triggers the no-harm rule because of a risk of significant transboundary harm. States still have wide discretion to determine if a risk of transboundary harm meets the threshold level of 'significant' harm. However, prior decisions of international courts and tribunals provide states and their decision-makers with a reasonable level of guidance in this regard, thereby reducing ambiguity.[2]

[2] See chapter 7.7.3.

There is always going to be a certain level of ambiguity concerning the duty of due diligence; it is important that the no-harm rule remains flexible in this regard to accommodate a wide range of activities and risks. As demonstrated in chapter seven, exactly what a state must do to prevent significant transboundary harm from a proposed SAI activity will depend on the situation at hand, including the nature of the proposed activity and the capacity of the state involved.[3] However, it is clear that states must fulfil procedural obligations as part of their obligation of due diligence. A state proposing to attempt SAI must first ascertain if it poses a risk of significant transboundary harm.[4] If so, it is clear that the state must then conduct an EIA prior to commencing the activity (although the content of the EIA is not prescribed under customary international law). Finally, if the EIA confirms a risk of significant transboundary harm, the state in question must then notify and consult with other potentially affected states. Therefore, in a number of respects, the no-harm rule provides states with distinct obligations for SAI proposals that present a risk of significant transboundary harm.

From the perspective of interactional international law, the no-harm rule meets the elements of shared understandings, criteria of legality, and practice of legality to a greater extent for transboundary harm than for harm to the global commons. The no-harm rule for transboundary harm is founded on robust shared understandings of state sovereignty and sovereign territorial rights.[5] It also satisfies the criteria of legality to a greater extent.[6] This is because its content is clearer and it is also easier to predict how the no-harm rule will be interpreted to apply to risks of transboundary harm. However, there is scope for improvement. In particular, the no-harm rule for transboundary harm does not meet the criterion of congruence.[7] Efforts to argue and enforce the no-harm rule in recent cases before international courts and tribunals provide evidence of practice of legality. But, as demonstrated in chapter eight, this practice is not universal in all instances of transboundary harm.[8] Although its capacity could be bolstered, the findings of this project nevertheless suggest that there is a reasonable prospect that the no-harm will exert a sense of legal obligation over states for risks of transboundary harm from SAI. This means that there is also a prospect that states will comply with the no-harm rule in this context.

At this point, it is important to remember that this project focuses only on a distinct aspect of the potential of the no-harm rule to contribute to the governance of SAI. It considers the

[3] See chapter 7.4.1.
[4] Chapter 7.4.1.
[5] Chapter 8.2.1.
[6] See chapter 8.3.9, figure 8.1.
[7] Chapter 8.3.8.
[8] Chapter 8.4.

potential of no-harm rule in the context of *ex ante* governance, to prevent harm *before* it occurs. It has not given detailed consideration to its role *ex post*. That is, the no-harm rule's potential to respond to harm *after* it occurs by forming the basis of a claim of state responsibility. This potential of the no-harm rule has already been considered at length by legal scholars.[9] As mentioned in chapter two, existing analysis highlights some fundamental difficulties with the no-harm rule in this respect. For example, it would be challenging to establish a causal link between an SAI activity and an alleged incident of transboundary harm.[10] It may also be challenging to establish a breach of due diligence.[11] Additionally, the state in breach of the no-harm rule would need to consent to have the matter heard before an international court or tribunal. Only 72 states have made declarations in accordance with Article 36(2) of the *Statute of the International Court of Justice*, recognising the jurisdiction of the Court as compulsory.[12] Key states that have not accepted compulsory jurisdiction included the United States, Russia and China. The United Kingdom only recognises compulsory jurisdiction in disputes with countries outside Commonwealth.[13] This precludes compulsory jurisdiction in disputes with the 52 states that are currently members of the Commonwealth.[14] This represents a significant practical hurdle to holding states responsible for transboundary harm the might result from future attempts at SAI. The no-harm rule therefore does not provide a *comprehensive* means of governing risks of transboundary harm from SAI. However, until such time as a more robust international agreement might be negotiated, it provides international law with a *basic* avenue to respond to such risks before they eventuate.

By contrast, the no-harm rule is inadequate in the context of risks of harm to the global commons and is unlikely to provide even a basic means of responding to risks of harm to the atmosphere from future attempts at SAI. One reason is that the no-harm rule as a principle of customary international law has not been applied to harm to the global commons in a contentious case.[15] International courts and tribunals therefore have not had the opportunity to

[9] See Saxler, Siegfried and Proelss, above n 1; Reichwein et al, above n 1.
[10] See Reichwein et al, above n 1, 157-166.
[11] See Saxler, Siegfried and Proelss, above n 1, 122-123.
[12] *Jurisdiction: Declarations Recognizing the Jurisdiction of the Court as Compulsory*, International Court of Justice, (17 November 2016) < http://www.icj-cij.org/jurisdiction/index.php?p1=5&p2=1&p3=3>. Some of these declarations are conditional. See, eg, 'Declaration made by Japan on the 6 October 2015', *Jurisdiction: Declarations Recognizing the Jurisdiction of the Court as Compulsory*, International Court of Justice, (17 November 2016) < http://www.icj-cij.org/jurisdiction/index.php?p1=5&p2=1&p3=3>.
[13] 'Declaration made by the United Kingdom of Great Britain and Northern Island', *Jurisdiction: Declarations Recognizing the Jurisdiction of the Court as Compulsory*, International Court of Justice, (17 November 2016) < http://www.icj-cij.org/jurisdiction/index.php?p1=5&p2=1&p3=3>.
[14] *Member Countries*, The Commonwealth, < http://thecommonwealth.org/member-countries>.
[15] See Chapter 7.3.

elucidate the content of the no-harm rule in this context, unlike in the context of transboundary harm between neighbouring states. The decisions of international courts and tribunals are only binding on the parties to the case, but nevertheless provide considerable guidance as to how other states should interpret obligations under the no-harm rule for activities that pose a risk of significant transboundary harm, including for determining whether a risk of transboundary harm is likely to qualify as 'significant'.[16] However, this guidance is lacking for risks of significant harm to the atmosphere as a global commons area. It is therefore more challenging to identify when such risks would give rise to obligations and how obligations under the no-harm rule like the duty to notify and consult with other states[17] should apply.

The no-harm rule satisfies the elements of interactional law theory to a lesser extent for harm to the global commons than for transboundary harm. A key difference here is the element of shared understandings, as prevention of harm to the global commons is not underpinned by existing understandings and practice concerning the rights of states.[18] There is no widespread community of practice involving both state and non-state actors to promote the development of shared understandings.[19] Greater doctrinal ambiguity also means that the no-harm rule satisfies the criteria of legality to a lesser extent for harm to the global commons. In particular, the no-harm rule satisfies the criteria of clarity, constancy/predictability and impossibility to only a low degree.[20] Finally, it is difficult to identify examples of practice of legality involving state actors. Unlike transboundary harm, there are no clear examples where states have attempted to enforce the no-harm rule for the global commons. It is also unclear how states would do this through existing rules of state responsibility.[21] As explained in chapter eight, enforcement on its own does not account for a sense of legal obligation, but plays an important role in developing a practice of legality. [22] There is therefore little prospect that the no-harm rule will exert a sense of legal obligation and promote compliance from states in the context of risks of harm to the global commons from SAI.

[16] Chapter 7.3.3.
[17] See chapter 7.4.1.
[18] See chapter 8.2.1.
[19] See chapter 8.2.2.
[20] Chapter 8.3.9, figure 8.1.
[21] For further discussion see 9.3.3 below. States may have a right of *actio popularis*. However, as noted by Sands and Peel, there is no state practice in support of such a right. See Philippe Sands and Jacqueline Peel, *Principles of International Environmental Law* (Cambridge University Press, 3rd ed, 2012), 148, 151.
[22] Chapter 8.4. See also Jutta Brunnée and Stephen J Toope, *Legitimacy and Legality in International Law: An Interactional Account* (Cambridge University Press 2010), 111-114.

These findings are concerning. By its very nature, SAI will affect the atmosphere and the global climate system.[23] This is what SAI is *intended* to do. As outlined in chapter one, scientists suggest that SAI may also have serious side effects on precipitation patterns and the stratospheric ozone layer.[24] As highlighted in chapter one, existing multilateral agreements do not adequately address the risks posed by SAI.[25] Risks of harm to the global commons from SAI therefore appear to fall through the gaps of existing rules of international law.

As with transboundary harm above, this project does not propose that the no-harm rule would provide a *comprehensive* and *adequate* means to govern risks of harm to the global commons posed by SAI. It may be the case that an international agreement is needed to adequately govern these risks.[26] However, there is no indication that states plan to negotiate any such agreement in the foreseeable future. In the meantime, a growing number of scientists advocate that it is necessary to start field testing SAI,[27] so it is plausible that SAI will be deployed in the stratosphere before an international agreement can be negotiated. This project therefore considers how the no-harm rule might be developed in the meantime to bolster its capacity to respond to risks of harm to the global commons. These recommendations aim to bring this capacity on par with that for transboundary harm and provide international law with at least a basic prospect of preventing significant harm to the atmosphere from SAI.

9.3 DEVELOPING THE NO-HARM FOR THE PREVENTION OF HARM TO THE ATMOSPHERE AS A GLOBAL COMMONS

This projects makes four recommendations for the development of the no-harm rule for the global commons. The aims of these recommendations are: (a) to reduce doctrinal ambiguity; and (b) to enhance the sense of legal obligation the rule may exert over states should they

[23] Chapter 1.2.2; Chapter 7.3.1, 7.4.2.
[24] Chapter 1.2.2.
[25] Chapter 1.2.
[26] The desirability, design and purpose of an international agreement for SRM and geoengineering more generally has been mooted in the literature. See, eg, Chiara Armeni and Catherine Redgwell, 'International legal and regulatory issues of climate geoengineering governance: rethinking the approach' (2016) *Climate Geoengineering Governance Working Paper Series: 021* <http://geoengineering-governance-research.org/perch/resources/workingpaper21armeniredgwelltheinternationalcontextrevise-.pdf> ; Ian D Lloyd and Michael Oppenheimer, 'On the design of an international governance framwork for geoengineering ' (2014) 14(2) *Global Environmental Politics* 45; John Virgoe, 'International governance of a possible geoengineering intervention to combat climate change' (2009) 95(1-2) *Climatic Change* 103;
[27] See, eg, Jane C S Long, Frank Loy and M. Granger Morgan, 'Start research on climate engineering' (2015) 518 *Nature* 29; David W. Keith and Douglas G. MacMartin, 'A temporary, moderate and responsive scenario for solar geoengineering' (2015) 5(3) *Nature Climate Change* 201; David Keith, *A Case for Climate Engineering* (The MIT Press, 2013); Douglas G. MacMynowski et al, 'Can we test geoengineering?' (2011) 4(12) *Energy & Environmental Science* 5044.

decide to attempt SAI in the future. States, international organisations and international law scholars should:

(1) Build a widespread community of practice to promote mutual and sustained engagement between state and non-state actors regarding the no-harm rule for the global commons;
(2) Develop a set of relevant criteria or factors to provide states with greater guidance on how to determine if an activity poses a risk of 'significant' harm to the global commons;
(3) Clarify the means by which states can enforce the no-harm rule for the global commons against other states that breach their obligations under this rule;
(4) Clarify how procedural obligations should be interpreted in the context of the global commons as opposed to transboundary harm.

The first two of these four recommendations are the most important in the near-term. The development of a widespread community of practice involving both state and non-state actors is necessary to foster interactional lawmaking. This is a prerequisite for the progressive development of the no-harm rule. Without sustained interaction and a community of practice, interactional law theory suggests that it is unlikely that efforts to further develop the no-harm rule would have a practical impact on the understanding and practice of states. A clearer understanding of the threshold level of 'significant' harm is also a prerequisite to realising the effective operation of recommendations (3) and (4). It is necessary to determine when a proposed SAI activity will give rise to procedural obligations.[28] The decision in the *Certain Activities* case also suggests that this threshold will play an important role in determining whether a state has breached its obligations (procedural and substantial) under the no-harm rule.[29] For this reason, this research provides more detailed consideration of recommendations (1) and (2), and flags (3) and (4) for future consideration.

9.3.1 A community of practice for the prevention of significant harm to the global commons

Interactional law theory highlights the role of mutual engagement and interaction between state and non-state actors in building norms with a strong sense of legal obligation.[30] As noted by

[28] *Certain Activities Carried Out by Nicaragua in the Boarder Area (Costa Rica v Nicaragua) & Construction of a Road in Costa Rica Along the San Juan River (Nicaragua v Costa Rica) (Judgment)* (International Court of Justice, General List No 150 & 152, 16 December 2015) [104], [168]. See also Chapter 6.6.4; Chapter 7.4.1.
[29] See chapter 6.6.3-4.
[30] Brunnée and Toope, above n 22, 62-65. See also Chapter 3.4.1; Chapter 8.2.2.

Brunnée and Toope, 'without the mutual engagement of social actors in a community of practice, the formal norm will not exert social influence.'[31] In this view, it is imperative that state and non-state actors have opportunities to engage and interact with each other over application of the no-harm rule for the global commons. Communities of practice provide this opportunity.[32] It is therefore important to create 'space' that enables communities of practice to develop around the no-harm rule for the global commons.[33]

As noted in chapter eight, Brunnée and Toope privilege the role of international institutions in enabling communities of practice to develop around legal norms.[34] A number of legal scholars have recognised that international institutions (especially intergovernmental organisations) play an important role in the contemporary development of customary international law.[35] As noted by Wood:

> Through international organizations, states interact intensively and adopt positions, often jointly, on a continuing and collective basis that would have been unimaginable in the not too distant past. This inevitably has an important impact on the development of customary international law.[36]

Wood explains the role of international organisations in developing customary international law based on the traditional doctrinal account of state practice and *opinio juris*.[37] He suggests that the activities of states within international organisations (i.e. voting or debating) provide evidence of state practice and *opinio juris.*[38] He further suggests that international organisations may contribute to practice and *opinio juris* in their own right.[39] However, this is a more controversial argument as it is difficult to reconcile with the traditional doctrinal view of states as primary actors in international law, and solely responsible for the development of customary international law.[40] The concept of communities of practice and the role attributed to them in interactional law theory potentially offers a more nuanced account of the way in

[31] Ibid, 351.
[32] Ibid, 352.
[33] See Ibid 63-65, 353.
[34] Chapter 8.2.2.
[35] See Michael Wood, 'International Organizations and Customary International Law, 2014 Johathan J. Charney Ristinguished Lecture in Public International Law, Presented at Vanderbilt University Law School on November 4, 2014 ' (2015) 48(3) *Vanderbilt Journal of Transnational Law* 609. See also Jonathan I. Charney, 'Universal International Law' (1993) 87(4) *The American Journal of International Law* 529, 543-545; Roozbeh B. Baker, 'Customary International Law in the 21st Century: Old Challenges and New Debates' (2010) 21(1) (February 1, 2010) *European Journal of International Law* 173; Ian Johnstone, *The Power of Deliberation: International Law, Politics and Organizations* (Oxford University Press, 2011).
[36] Wood, above n 35, 614.
[37] Ibid.
[38] Ibid.
[39] Ibid, 614.
[40] See ibid, 616-619.

which international organisations can contribute to the development of customary international law.

The first step towards developing the no-harm rule for the global commons is to understand how international organisations might be used and which may be the most suitable to facilitate the development of a widespread community of practice between state and non-state actors. It is beyond the scope of this project to fully undertake this analysis but this section provides a preliminary assessment of the suitability of four prominent institutions.

The UN General Assembly

The first international institution that could help develop a community of practice around the no-harm rule for the global commons is the UN General Assembly (UNGA). The UNGA is a well-established institution that provides states with a forum to deliberate matters of international law. Under the *Charter of the United Nations*, the UNGA has the capacity to promote the codification and progressive development of international law.[41] Membership of the UNGA is restricted to states. Non-state actors can participate in the UN System through the Economic and Social Council, through the UN Department of Public Information, or through special events organised by the President of the UNGA.[42] However, there are no formal mechanisms to allow NGOs to participate in the UNGA.[43] Owing to this limited membership, it is doubtful that the UNGA would be able to facilitate the development of a widespread community of practice between state and non-state actors for the no-harm rule for the global commons.

The International Law Commission

Another potential institution to consider is the International Law Commission (ILC). The ILC's mandate is the 'promotion of the progressive development of international law and its codification'.[44] The ILC has the capacity to act as a 'norm entrepreneur' to seek to deliberately build new norms and promote new standards for appropriate behaviour in international law.[45] The membership of the ILC is comprised of experts in international law acting in their private

[41] *Charter of the United Nations* art 13(1)(a).
[42] See *Civil Society*, United Nations, <http://www.un.org/en/sections/resources/civil-society/index.html>.
[43] Jens Martens, 'The Future of NGO Participate at the United Nations after the 2005 World Summit', (2006) Dialogue on Globalization Briefing Papers < http://library.fes.de/pdf-files/iez/global/50188.pdf> 2.
[44] *Statute of the International Law Commission*, GA Res 174(II), UN GAOR, 2nd sess, 123rd mtg, (21 November 1947) art 1(1) ('*Statute of the International Law Commission')*.
[45] Martha Finnemore and Kathryn Sikkink, 'International Norm Dynamics and Political Change' (1998) 52(4) *International Organization* 887, 896-897. See also Brunnée and Toope, above n 22, 57-58. See also chapter 8.8.2.

capacity.[46] The ILC also engages with the governments of states and the UN General Assembly at different stages throughout a project. In this sense, the structure of the ILC may facilitate the engagement of a broader range of state and non-state actors than the UNGA regarding the development of the no-harm rule for the global commons.

However, the nature of this engagement requires further assessment. The ILC provides states with opportunities to supply information and comment on the ILC's work,[47] but it is unclear whether this level of engagement would be sufficiently prolonged and mutual to sustain a process of interactive lawmaking. The UNGA plays a more direct role in the work of the ILC, including referring topics for consideration, debating reports provided by the ILC, encouraging informal discussions between members of the sixth committee on the work of the ILC, and, in some instances, it has initiated diplomatic conferences to study an adopt the ILC's draft conventions.[48] However, as noted above, civil society is largely absent from this process. Further research is needed to consider the process of codification and progressive development of international law within the ILC and the extent to which it may be expected to promote *interactive* lawmaking and the development of widespread communities of practice for the no-harm rule for the global commons.

International Union for the Conservation of Nature (IUCN)

The IUCN is a union that pursues environmental protection, conservation and sustainable development. Its membership is comprised of 1300 member organisations from governments and civil society, as well as 16,000 experts.[49] The IUCN therefore has a much broader and diverse membership than the ILC and the UNGA. It provides a forum for 'governments, NGOs, scientists, businesses, local communities, indigenous peoples groups, faith-based organisations and others can work together to forge and implement solutions to environmental challenges.'[50] It has a dedicated environmental law program, which could provide a forum for a wide range of state and non-state actors to interact and discuss the development of the no-harm rule for the prevention of significant harm to the global commons. Further research is warranted to better

[46] *Membership: Qualifications and Nationality*, International Law Commission, (16 August 2016) <http://legal.un.org/ilc/ilcmembe.shtml>.
[47] See *About the Commission: Organization, programme and methods of work*, International Law Commission, (22 July 2015) <http://legal.un.org/ilc/governments.shtml>. Under art 17(1) of the *Statute of the International Law Commission* the governments of states may ask the ILC to consider proposals and draft multilateral conventions, but this has never taken place.
[48] Ibid.
[49] *The Union*, IUCN, <https://www.iucn.org/secretariat/about/union>.
[50] *About*, IUCN, < https://www.iucn.org/about>.

understand the role of the IUCN in international lawmaking and how it might contribute to the development of a widespread community of practice around the no-harm rule for the prevention of harm to the global commons.

Millennium Development Goals (MDGs) & Sustainable Development Goals (SDGs)

The MDGs and SDGs are not 'institutions' in the formal sense, like the UNGA, the ILC or the IUCN. They are universally applicable goals to guide and shape law, policy and development at national, regional and global levels.[51] The SDGs succeeded the earlier MDGs, and were adopted by UN General Assembly Resolution 70/1 on the 25th September 2015.[52] The SDG aspire to end poverty as well as address related issues including climate change and environmental protection.[53] The SDGs are non-binding on states, but they provide a framework within which governments, corporations, civil society and NGOs can discuss issues of global environmental concern.

The prevention of harm to the global commons fits directly with the following SDGs:

> Goal 13: *Take urgent action to combat climate change and its impacts*;[54]
>
> Goals 14: *Conserve and sustainably use the oceans, seas and marine resources*.[55]

It may also fit indirectly with other SDGs, such as goal 6 (clean water and sanitation), goal 7 (affordable and clean energy), and goal 12 (responsible consumption and production).[56] Further consideration should therefore be given to the suitability of the SDGs as a means to facilitate greater engagement between state and non-state actors concerning the no-harm rule for the prevention of significant transboundary harm to the global commons.

9.3.2 Criteria for determining significant harm to the global commons

A set of criteria to assist states in determining when a proposed activity posed a risk of significant harm to the global commons would greatly enhance the capacity no-harm rule to

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[51] See *The Sustainable Development Agenda*, Sustainable Development Goals, < http://www.un.org/sustainabledevelopment/development-agenda/>.
[52] *Transforming our world: the 2030 Agenda for Sustainable Development*, GA Res 70/1, UN GAOR, 70th sess, Agenda Items 15 and 116, UN Doc A/RES/70/1 (25 September 2015).
[53] See *The Sustainable Development Agenda*, Sustainable Development Goals, < http://www.un.org/sustainabledevelopment/development-agenda/>.
[54] *Take urgent action to combat climate change and its impacts*, Sustainable Development Goals, < http://www.un.org/sustainabledevelopment/climate-change-2/>.
[55] *Conserve and sustainably use the oceans, seas and marine resources*, Sustainable Development Goals, < http://www.un.org/sustainabledevelopment/oceans/>.
[56] *Sustainable Development Goals*, Sustainable Development Goals, < http://www.un.org/sustainabledevelopment/sustainable-development-goals/>.

reduce the risks of harm to the atmosphere from SAI. Given the general nature of the no-harm rule as a principle of customary international law, a universal set of criteria may also have broader application to activities other than SAI and thereby bolster the capacity of the no-harm rule more generally to respond to other risks of significant harm to the global commons.

The *Convention on Environmental Impact Assessment in a Transboundary Context*[57] *('Espoo Convention')* and the *Protocol on Environmental Protection to the Antarctic Treaty* [58]*('Antarctic Environmental Protocol')* provide guidance on what a general set of criteria might include. Appendix III of the *Espoo Convention* provides a list of three general criteria that may indicate that an activity is likely to have a 'significant adverse transboundary impact' for the purpose of article 2(5) of the convention. These criteria are the size and location of a proposed activity, and the effects it is likely to have on the environment. Parties to the *Espoo Convention* must consider these criteria for proposed activities that are located close to an international border and those that might not be close, but nevertheless 'give rise to significant transboundary effects far removed from the site of development.'[59] The criteria under Appendix III of the *Espoo Convention* are therefore directed at establishing the same threshold level of harm as the no-harm rule.

The major drawback of Appendix III of the *Espoo Convention* is that it specifically addresses transboundary harm between states, rather than harm to the global commons. Article 3(2)(c) of the *Antarctic Environment Protocol*, on the other hand, establishes rules for human activities in Antarctica to prevent harm to the environment. Article 3(2)(c) provides a list of features that must be taken into consideration when assessing the possible impact of scientific research on the Antarctic environment – a recognised global commons. The general aim under article 3 of the Protocol is to limit adverse impacts on the Antarctic environment, not limited to a threshold of 'significant' harm as is the case with the no-harm rule, but article 3(2)(c) nonetheless indicates what type of considerations may be relevant in the context of the global commons as opposed to transboundary harm.

Based on Appendix III of the *Espoo Convention* and article 3(2)(c) of the *Antarctic Environment Protocol*, the following criteria provide a useful framework for assessing the severity of risks of harm to the global commons.

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[57] *Convention on Environmental Impact Assessment in a Transboundary Context*, opened for signature 25 February 1991, 1989 UNTS 309 (entered into force 10 September 1997) ('*Espoo Convention*').
[58] *The Protocol on Environmental Protection to the Antarctic Treaty*, opened for signature 4 October 1991, [1998] ATS 6 (entered into force 14 January 1998) ('*Antarctic Environmental Protocol*').
[59] *Espoo Convention*, Appendix III (2).

1. *The scope of the activity, including its area, duration and intensity*

The *Espoo Convention* lists a criterion of scale, which encourages Parties to consider whether a proposed activity is 'large' for its type.[60] The physical size of a proposed SAI activity would be an important consideration. However, geographical size alone may not accurately reflect the potential impacts of SAI. Thinking back to the hypothetical scenarios in chapter seven, a key issue is more likely to be the volume of precursor to be used and the corresponding amount of particles to be created in the stratosphere. For this reason, it would also be important to take into account the magnitude or intensity of a proposed SAI activity. That is, the amount of particles to be created in the atmosphere and the amount of sunlight that they are likely to reflect (radiative forcing).[61] A further relevant consideration would be the duration of a proposed SAI activity – the timeframe over which it would be conducted may also be relevant in considering whether it poses a risk of significant harm to the global commons.[62] For example, continuous deployment of SAI as in scenario 3 may indicate greater severity of impacts than deployment lasting only three months, as in scenario 1. These considerations are better reflected in article 3(2)(c)(i) of the *Antarctic Environmental Protocol.* It requires parties to take into account 'the scope of the activity, including its area, duration and intensity'. This approach would therefore be preferable for assessing the risks of harm to the global commons.

2. *The location of the activity, including whether it will be located or conducted within a global commons area, and/or the proximity of protected areas or sites of scientific or culturally significance;*

The location of an activity is a relevant consideration under Appendix III(1)(b) of the *Espoo Convention.* The proximity of a proposed activity to protected areas, such as *Ramsar* wetlands[63] and sites of cultural or historic significance[64] may indicate that an activity carries a risk of causing significant adverse transboundary impacts[65] or indeed impacts on global commons such as Antarctica.[66] However, they do not readily translate to the atmosphere, as it does not

[60] *Espoo Convention,* Appendix III, 1(a).
[61] For a discussion on radiative forcing and SAI see Keith and MacMartin, above n 27; Douglas G. MacMartin, Ken Caldeira and David W. Keith, 'Solar geoengineering to limit the rate of temperature change' (2014) 372(2031) *Phil. Trans. R. Soc. A* 1.
[62] See Reichwein et al, above n 1, 162.
[63] *Convention on Wetlands of International Importance,* opened for signature 2 February 1971, 996 UNTS 246 (entered into force 21 December 1975).
[64] *Convention Concerning the Protection of the World Cultural and Natural Heritage,* opened for signature 16 November 1972, 1037 UNTS 151 (entered into force 17 December 1975).
[65] *Espoo Convention,* Appendix III 1(b)
[66] For example, proximity to historically significant sites. See *Antarctic Environmental Protocol*, art 3(2)(h).

contain any protected areas or sites of cultural or historical significance. This does not mean that the location of an activity will be irrelevant when determining if it poses a risk of harm to the atmosphere. A key consideration in the context of future SAI activities is the fact that they are conducted *within* the atmosphere as a global commons.

3. *The purpose of the activity, including whether it is intended to change or modify a global commons area*

Not only would SAI be conducted within the atmosphere, it would be done with the deliberate intention of modifying the atmosphere and global climate system. This characteristic of SAI (and geoengineering proposals more broadly) highlights the need to think beyond the mere location of a proposed activity to consider how its purpose might also indicate a risk of significant harm.

4. *The potential effects of the activity, including*
    - *(i) Whether the activity will have complex and/or potentially adverse effects on humans, organisms or ecosystems;*
    - *(ii) Whether the activity will detrimentally affect other activities or potential future activities conducted in or involving a global commons area;*
    - *(iii) The cumulative impacts of the activity on the global commons, both by itself and in combination with other activities;*
    - *(iv) Whether the activity is likely to contribute to or exacerbate an existing environmental problem within a global commons area*

Appendix III of the *Espoo Convention* lists the following effects:

> [P]roposed activities with particularly complex and potentially adverse effects, including those giving rise to serious effects on humans or on valued species or organisms, those which threaten the existing or potential use of an affected area and those causing additional loading which cannot be sustained by the carrying capacity of the environment.

Harm to humans, species and organisms as highlighted within Appendix III of the *Espoo Convention* will be an important consideration when it comes to risks of transboundary harm from SAI. These risks were highlighted in all three hypothetical scenarios in chapter seven. Harm to humans, species and organisms may also be relevant for assessing risks of harm to the global commons areas of the high seas and Antarctica.[67] Harm to humans, species and

[67] Article 3(2)(b) of the *Antarctic Environmental Protocol* lists specific impacts that Parties should avoid causing to the Antarctic environment, including: 'significant changes in the atmospheric, terrestrial (including aquatic), glacial or marine environments'; 'detrimental changes in the distribution, abundance or productivity of species or populations of species of fauna and flora'; further jeopardy to endangered or threatened species or

organisms should therefore be included as part of a general list of criteria to consider for assessing whether an activity poses a risk of significant harm to a global commons area.[68] However, owing to the nature of the atmosphere, it would be of little use in assessing whether a future SAI activity poses a risk of significant harm to the atmosphere *per se*.

A more relevant consideration would be the potential impact of SAI on other uses of the atmosphere. Robock, a leading atmospheric chemist, suggests that SAI may affect other ways in which humans utilise the atmosphere and solar energy. For example, it may '[d]egrade terrestrial optical astronomy'; have '[e]ffects on aeroplanes flying in the stratosphere'; result in '[l]ess solar energy generation'; and '[d]egrade passive solar heating'.[69] Impacts upon the 'use of an area' is included within article 3(2)(c)(iii) of the *Antarctic Environmental Protocol.* This project proposes that a similar provision be taken into account when determining if an activity poses a risk of significant harm to the global commons.

It may also be relevant to consider whether an activity will have cumulative effects on a global commons area. Article 3(2)(c)(ii) of the *Antarctic Environmental Protocol* encourages Parties to take account of 'the cumulative impacts of the activity, both by itself and in combination with other activities in the Antarctic Treaty area'. A similar provision would be prudent in the context of future attempts at SAI. It may encourage states and decision makers to take into account other SAI activities, such as in hypothetical scenario 3, where state 'E' decided to commence its own SAI program in addition to that of state 'A'.[70] Highlighting this as a relevant consideration for assessing severity of harm could also encourage states and policymakers to consider how SAI may interact with CDR geoengineering proposals, such as bioenergy with carbon capture and storage, or ocean fertilisation. Lastly, it would also encourage states and decision makers to consider how SAI is likely to interact with natural phenomena, such as large volcanic eruptions.[71]

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populations of such species'; and 'degradation of, or substantial risk to, areas of biological scientific, historic, aesthetic or wilderness significance.'

[68] Article 3(2)(b) of the *Antarctic Environmental Protocol* lists specific impacts that Parties should avoid causing to the Antarctic environment, including: 'significant changes in the atmospheric, terrestrial (including aquatic), glacial or marine environments'; 'detrimental changes in the distribution, abundance or productivity of species or populations of species of fauna and flora'; further jeopardy to endangered or threatened species or populations of such species'; and 'degradation of, or substantial risk to, areas of biological scientific, historic, aesthetic or wilderness significance.'

[69] Alan Robock, 'Stratospheric Aerosol Geoengineering' in Roy Harrison and Ron Hester (eds), *Geoengineering of the Climate System* (The Royal Society of Chemistry, 2014) 162, [181].

[70] Chapter 7.2.

[71] See A. Laakso et al, 'Radiative and climate impacts of a large volcanic eruption during stratospheric sulfur geoengineering' (2016) 16(1) *Atmos. Chem. Phys.* 305.

In the context of future attempts at SAI, it may also be relevant to consider the way in which a proposed activity may contribute to existing environmental problems within a global commons area. As noted in chapter seven, SAI may exacerbate existing problems, such as ozone depletion and atmospheric aerosol loading.[72] One way to address this would be the approach taken under Appendix III of the *Espoo Convention*, which asks whether an activity may 'cause additional loading which cannot be sustained by the carrying capacity of the environment.'[73] Such a provision could mean that SAI activities which are otherwise considered small in size, magnitude and/or duration (such as small scale field tests) may nevertheless be assessed as posing a risk of significant harm if they risk exceeding the critical limits on atmospheric pollution.[74]

However, the way this issue is phrased under the *Espoo Convention* may not be appropriate for harm the global atmospheric commons. It assumes that carrying capacity of a system is established or easy to establish. As noted in chapter seven, scientists are as yet to define what the precise limits of the atmosphere are in relation to aerosol loading.[75] The use of terms such as 'loading' and 'carrying capacity' would exclude situations where a problem involves the depletion of a resource rather than the addition of pollutants. Given the potential for SAI to deplete the stratospheric ozone layer it is important that the criterion of effects is worded in such a way as to also address resource depletion. This project therefore recommends taking a broader approach, considering instead whether an activity will contribute to or exacerbate an existing environmental problem.

5. *The capacity to monitor and safely conduct the activity, including*
    - *(i) Whether technology and procedures are available to provide for environmentally safe operations;*
    - *(ii) Whether there exists the capacity to monitor key environmental parameters and ecosystem components so as to identify and provide early warning of any adverse impacts of the activity and provide for such modification of operating procedures as may be necessary in light of the result of monitoring and increased knowledge of the environment and dependant and associated ecosystems of a global commons;*

[72] Chapter 7.3.2. See also chapter 1.2.2.
[73] *Espoo Convention*, Appendix III 1(c).
[74] See chapter 7.3.2.
[75] Ibid.

(iii) Whether there exists the capacity to respond properly and effectively to accidents, particularly those with potential effects on a global commons

This criterion is adapted from article 3(2)(c)(iv)-(vi) of the *Antarctic Environmental Protocol*. The purpose of this criterion would be to encourage states and decision makers to take a broader view of what might constitute a risk of significant harm. It may be prudent to think beyond the location and nature of likely impacts from the activity on a global commons area, to also consider the capacity to detect and respond to such impacts.

The capacity to detect and respond to impacts will be important considerations in assessing whether SAI poses a risk of significant harm to the atmosphere. The difficulties of detecting and responding to future SAI field tests and deployment are identified by Robock et al.[76] According to Robock et al, it may be impossible to distinguish the impact of small-scale SRM field tests from the existing 'noise' of weather and climate variations.[77] In the case of large-scale experiments and full-scale deployment, Robock et al further suggest that, no matter if negative side-effects are detected, it may be 'difficult to stop such an experiment quickly.'[78] This is because stopping large-scale attempts at SAI may result in a rapid increase in global temperatures that could have more serious consequences than the current rate of global warming.[79] Lastly, Robock et al note that there is currently no comprehensive system for monitoring the effects of any field testing.[80] The limitations in monitoring and managing SAI arguably heighten the risk of significant harm to the atmosphere, and therefore should be taken into account when determining if a proposed SAI activity gives rise to obligations under the no-harm rule.

These criteria should be developed as an illustrative, rather than an exclusive list, so that they can remain general and open to other relevant considerations. This would preserve the inherent flexibility in the no-harm rule, enabling it to apply to a wide ranges of scenarios. Moreover, the criteria need not be legally binding, instead playing a similar role to the 'significant impact criteria' establishing by the Australian Government Department of the Environment[81] that

[76] Alan Robock et al, 'A Test for Geoengineering?' (2010) 327(5965) *Science* 530, 531. For further discussion on the 'termination problem' see chapter 1.2.2.
[77] Ibid, 531. But see Keith and MacMartin, above n 27, 204.
[78] Robock et al, above n 76, 531.
[79] Ibid.
[80] Ibid.
[81] *Matters of National Environmental Significance: Significant impact guidelines 1.1, Environment Protection and Biodiversity Conservation Act 1999*, (2013) Department of the Environment, <https://www.environment.gov.au/system/files/resources/42f84df4-720b-4dcf-b262-48679a3aba58/files/nes-guidelines_1.pdf>

assist in determining whether a proposed activity is likely to have a 'significant impact on a matter of national environmental significance' such that it must be referred for approval under the *Environment Protection and Biodiversity Conservation Act 1999* (Cth).[82] The criteria proposed for the no-harm rule could take the form of a non-binding set of guidelines to assist states and legal scholars interpret the no-harm rule, similar to the work produced by the ILC. The criteria proposed for the no-harm rule would similarly provide states, their scientists and decision-makers with *guidance* on how to assess whether a proposed activity meets the threshold level of 'significant' harm, triggering obligations under the no-harm rule. These criteria would also clarify if and when states should fulfil relevant procedural obligations. If developed through an interactive approach involving a community of practice as outlined above, these criteria could influence the decision-making of states, regardless of their non-binding status.

Scientific opinion and assessment will play a necessary role in determining if a proposed SAI activity will pose a risk of significant harm to the global commons - there is no 'one-size-fits-all' approach to assessing severity of harm. The criteria proposed above would not remove *all* discretion from the assessment and decision-making process, nor would they erase *all* ambiguity with regards to doctrinal analysis and the elements of interactional law theory. They would, however, reduce the discretion states currently have in determining whether the no-harm rule applies to future attempts at SAI. Providing greater guidance on its application would give the no-harm rule better prospects of meeting the criteria of legality and promoting a stronger sense of legal obligation in the context of risks of harm to the global commons.

9.3.3 State responsibility for harm to the global commons

The third recommendation is to clarify how the no-harm rule for the protection of the global commons might be enforced against states that do not comply with their due diligence and procedural obligations. In the specific context of the atmosphere, this would require clarifying whether states owe a collective obligation to all other states to protect the atmosphere from significant harm. That is, whether states have an obligation *erga omnes,* in which significant harm to the atmosphere is deemed to injure the legal interests of *all* states.[83] The concept that

[82] Ibid, 1.

[83] See Jonathan I Charney, 'Third State Remedies for Environmental Damage to the World's Common Spaces ' in Francesco Francioni and Tullio Scovazzi (eds), *International Responsibility for Environmental Harm* (Graham & Trotman, 1991) 149, 166. See also Kathy Leigh, 'Liability for Damage to the Global Commons' (1992) 14 *Australian Year Book of International Law* 129, 142-144; Malgosia Fitzmaurice, 'Liability for Environmental Damage Caused to the Global Commons' (1996) 5(4) *RECIEL* 305, 305.

states may owe obligations *erga omnes* to the international community as a whole was raised by the ICJ in the *Case Concerning the Barcelona Traction, Light and Power Company, Limited (Second Phase)* (‘*Barcelona Traction*’).[84] According to Fitzmaurice, protection of the environment of the global commons falls within this category,[85] but this view has not been affirmed by an international court or tribunal.[86]

A further question is whether states have corresponding standing to bring an action against states that breach their obligations under the no-harm rule for the global commons.[87] That is, whether they might invoke the rules of state responsibility to hold a state accountable for such a breach. Article 48(1)(b) of the ILC *Draft Articles on State Responsibility* suggests that any state may invoke the responsibility of another if ‘the obligation breached is owed to the international community as a whole.’[88] However, this right has not been successfully exercised by states in the context of harm to the global commons.[89] According to Leigh, international courts and tribunals have typically taken a restrictive approach to the enforcement of such rights.[90] For example, the ICJ did not recognise a corresponding right of *actio popularis* (‘the right to take legal action in vindication of a public interest’) in the *South-West Africa Cases (Second Phase)*.[91] It therefore remains unclear whether states would have a right under customary international law to enforce the no-harm rule for the prevention of harm to the global commons against other states.

It is important to clarify rules of standing and the process of enforcement to further reduce doctrinal uncertainty regarding the no-harm rule for the global commons. Additionally, as noted above, enforcement is an important part of a practice of legality under interactional law theory, although clarifying enforcement mechanisms would not *necessarily* lead to the development of such practice. Enforcing the no-harm rule for the global commons would face the same hurdles as outlined above in section 9.2 for transboundary harm, such as establishing causation and consent-based jurisdiction. However, providing states with at least *a means* to

[84] *Case Concerning the Barcelona Traction, Light and Power Company, Limited (Second Phase) (Belgium v Spain) (Judgment)* [1970] ICJ Rep 3, 32 (‘*Barcelona Traction*’).
[85] See Fitzmaurice, above n 83, 307.
[86] The ICJ in the Barcelona Traction case affirmed acts of aggression, genocide, protection from slavery and racial discrimination as *egra omne*. See *Barcelona Traction*, [1970] ICJ Rep 3, [34].
[87] Fitzmaurice, above n 83, 308.
[88] ‘Draft Articles on Responsibility of States for Internationally Wrongful Acts, with commentaries’ (2001) II(2) *Yearbook of the International Law Commission* 31, art 48(1)(b).
[89] Sands and Peel, above n 21, 148. Sands and Peel note that there is an absence of state practice in support of such a right in the context of environmental harm to the global commons.
[90] Leigh, above n 83, 150.
[91] *South-West Africa Cases (Second Phase) (Ethiopia v South Africa); (Liberia v South Africa) (Judgment)* [1966] ICJ Rep 6 [88]. See also ibid.

enforce the no-harm rule for the global commons is a necessary step towards enabling such practice. It would put the no-harm rule for the global commons on par with the no-harm rule for transboundary harm.

9.3.4 Clarifying procedural obligations for the global commons

The fourth and final recommendation is to develop a clearer understanding of how key procedural obligations of conducting an EIA and notifying and consulting with other states apply to activities that risk causing significant harm to the atmosphere.[92] A set of criteria for identifying risks of 'significant' harm to the global commons as outlined above would assist in clarifying several procedural obligations. Firstly, since the content of an EIA is not prescribed under customary international law,[93] so the criteria could be used to inform the terms of reference for EIA relating to activities affecting the global commons. They highlight issues that ought to be taken into account when assessing the nature and severity of risk posed by a proposed activity.

However, further development of the no-harm rule is needed to clarify with *whom* the content of an EIA for the global commons should be shared in accordance with the duty to notify and consult. Short of notifying and consulting with all 192 states, it is unclear how states should fulfil this procedural obligation when it comes to risks of harm to the atmosphere.[94] This is not as big an issue for other global commons, such as Antarctica and the High Seas, as they are already governed by treaty bodies and have clear mechanisms for notification, consultation and cooperation.[95] However, there is no treaty or international organisation for the protection of the atmosphere as a whole.

The most appropriate course of action for resolving this issue may be to charge an existing international organisation (or create a new one) with decision-making authority over activities affecting the atmosphere.[96] This would be difficult to achieve in practice because it would require negotiation of an international agreement, and would therefore be beyond the scope of customary international law. It would also be politically challenging to convince states to

[92] This is not so much of a problem for risks of harm to Antarctica and the High Seas, for which procedural obligations are more clearly set out under respective treaty instruments. See *United Nations Convention on the Law of the Sea*, opened for signature 10 December 1982, 1833 UNTS 3 (entered into force 16 November 1994) art 206 ('*UNCLOS*').
[93] See chapter 7.4.1.
[94] Ibid.
[95] See *UNCLOS* art 205, 206; *Antarctic Environmental Protocol*, art 6.
[96] Chapter 7.4.1. See also Neil Craik, 'International Law and Geoengineering: Do Emerging Technologies Require Special Rules?' (2015) 5(2-4) *Climate Law* 111, 128.

endow an international organisation with such decision-making authority. This is clearly an issue that demands further consideration and may be hard to resolve. Developing the no-harm rule for the global commons so that its capacity is equivalent to transboundary harm may therefore be unachievable when it comes to the duty to notify and consult. The duty to notify and consult for risks of harm to the global commons might be beyond the capacity of the no-harm rule to contribute to the governance of SAI.

9.4 CONCLUSION

This chapter has synthesised the key findings from doctrinal legal analysis and application of interactional law theory to the no-harm rule. It is clear from this analysis that the no-harm rule does not provide a universal solution to the international governance of SRM/SAI. It is well recognised in geoengineering literature that liability mechanisms would be an important aspect of international governance.[97] As noted in this chapter, there are many obstacles to the no-harm rule providing an adequate means to hold states responsible for harm that might result from an attempt at SAI. Furthermore, the no-harm rule would only provide a means to govern risks of harm. There are other governance challenges that the no-harm rule would not address. As summarised by Horton, Parker and Keith:

> Who decides when to use solar geoengineering? Who decides when to test it? How should these decisions be made? What climatic targets should guide an intervention? How should geoengineering be tied to mitigation and adaptation?[98]

This project has taken a narrow focus to analysing the capacity of the no-harm rule to contribute to the governance of SRM/SAI. It has expressly focused on the no-harm rule's capacity to contribute to the *ex ante* governance of risks of transboundary harm and harm to the global commons. In this respect, the findings of this project suggest that the no-harm rule would provide international law with a *basic* capacity to govern risks of significant transboundary harm posed by SAI. In light of the fact that risks of transboundary harm from SAI are not clearly governed by existing international agreements, and the prospect that scientists may field test SAI in the near future, the importance of this basic capacity should not be underestimated.

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[97] See, eg, Joshua B Horton, Andrew Parker and David Keith, 'Solar Geoengineering and the Problem of Liability ' (2013) *Geoengineering Our Climate? Working Papers and Opinion Articles* <http://geoengineeringourclimate.com/tag/solar-radiation-management/>; Anna-Maria Hubert and David Reichwein, 'An Exploration of a Code of Conduct for Responsible Scientific Research involving Geoengineering: Introduction, Draft Articles and Commentaries' (IASS, Potsdam Institute for Science, Innovation and Society, University of Oxford, 2015) 37-38; Saxler, Siegfried and Proelss, above n 1.

[98] Horton, Parker and Keith, above n 97, 2.

However, this basic capacity does not extend to risks of harm to the atmosphere *per se*. Given the nature of SAI and the way in which it is intended to interfere with the atmosphere and global climate system, the no-harm rule should be developed to apply to the global commons, so that its capacity in this context matches that for transboundary harm. Accordingly, this chapter has made four recommendations for the development of the no-harm rule for the global commons. These are (1) to encourage the development a community of practice for the no-harm rule through existing international institutions; (2) establish a set of criteria to provide states, policymakers and scientists with greater guidance on how to determine when an activity poses a risk of significant harm to the global commons; (3) clarify enforcement mechanisms for the no-harm rule for the global commons; and (4) clarify the way in which procedural obligations (especially the duty to notify and consult) are to be interpreted to apply in the context of risks of harm to the global commons.

These recommendations will not transform the no-harm rule into a *comprehensive* regime for the protection of the atmosphere, but would at least clarify the way in which the no-harm rule should be interpreted to apply to SAI and improve the extent to which it is likely to exert a sense of legal obligation over states to prevent significant harm to the atmosphere from activities under their jurisdiction and control. This is so that the no-harm rule might share the same, basic capacity to respond to risk of harm to the global commons from SAI as it currently has for risk of transboundary harm. This capacity is important until such a time as a comprehensive agreement for SRM/SAI might be negotiated. These recommendations would also serve to improve the capacity of international law more generally to protect the atmosphere as a global commons.

10 Conclusion

When this project commenced in February 2013, geoengineering had just emerged from the fringes of climate science as a potential response to anthropogenic climate change.[1] Geoengineering has continued to gain momentum over the duration of this project, with various events and publications bringing it within mainstream policy consideration. The first international academic conference specifically focusing on geoengineering was held in Berlin in 2014.[2] The IPCC considered and commented upon possible future use of geoengineering for the first time in Working Group 1 *Climate Change 2013: The Physical Science Basis* and the *Summary for Policymakers* of its Fifth Assessment Report.[3] A number of reports have been released by key national and international scientific and research bodies considering the science and governance of geoengineering.[4] Most recently, a report was released in October 2016 by the Secretariat of the Convention on Biological Diversity, considering the feasibility and potential effectiveness of geoengineering as a response to climate change and its implications for biodiversity.[5]

Consideration of geoengineering has intensified since the negotiation of the 2015 *Paris Agreement.*[6] The *Paris Agreement* was hailed as a diplomatic success,[7] setting an ambitious

[1] K A Brent and J McGee, 'The regulation of geoengineering: A gathering storm for international climate change policy?' (2012) 46(4) *Air Quality and Climate Change* 22, 22.
[2] See Institute for Advanced Sustainability Studies, *Climate Engineering Conference 2014: Critical Global Discussions, Conference Report* (2014) Institute for Advanced Sustainability Studies <http://www.ce-conference.org/>.
[3] Intergovernmental Panel on Climate Change, *Climate Change 2013: The Physical Science Basis. Contribution of Working Group I to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change* (Cambridge University Press, 2013) <https://www.ipcc.ch/report/ar5/wg1/> 27, 98, 468, 546.
[4] See, eg, Kelsi Bracmort and Richard Lattanzio, 'Geoengineering: Governance and Technology Policy' (CRS Report, Congressoinal Research Service, 26 November 2013); S Schäfer et al, 'The European Transdisciplinary Assessment of Climate Engineering (EuTRACE): Removing Greenhouse Gases from the Atmosphere and Reflecting Sunlight away from Earth' <http://www.eutrace.org/>; National Research Council, *Climate Intervention: Reflecting Sunlight to Cool the Earth* (The National Academies Press, 2015) <http://www.nap.edu/catalog/18988/climate-intervention-reflecting-sunlight-to-cool-earth>; National Research Council, *Climate Intervention: Carbon Dioxide Removal and Reliable Sequestration* (The National Academies Press, 2015) <http://www.nap.edu/catalog/18805/climate-intervention-carbon-dioxide-removal-and-reliable-sequestration>; Andrew R Bowie, Julia Jabour, Thomas W Trull, Karina McLachlan, Philip W Boyd, Tony Press, Delphine Lannuzel, Kerryn Brent, Jeffrey McGee, *Policy Analysis: Ocean Fertilisation*, (2016) Antarctic Climate & Ecosystems Cooperative Research Centre <http://acecrc.org.au/publication/ocean-fertilisation-2/>.
[5] P Williamson & R Bodle, 'Update on Climate Geoengineering in Relation to the Convention on Biological Diversity: Potential Impacts and Regulatory Framework', (2016) *Technical Series No.84. Secretariat of the Convention on Biological Diversity*, < https://www.cbd.int/doc/publications/cbd-ts-84-en.pdf>.
[6] *Paris Agreement*, opened for signature 12 December 2016 (entered into force 4 November 2016) < http://unfccc.int/paris_agreement/items/9485.php> art 4.
[7] See, eg, Fiona Harvey, 'Paris climate change agreement: the world's greatest diplomatic success', *The Guardian*, 14 December 2015 <https://www.theguardian.com/environment/2015/dec/13/paris-climate-deal-cop-

target of 'holding the increase in the global average temperature to well below 2 °C above pre-industrial levels and pursuing efforts to limit the temperature increase to 1.5 °C above pre-industrial levels'. [8] However, there are significant concerns that this target (especially the lower limit of 1.5 °C) is infeasible.[9] The Intended Nationally Determined Contributions made by countries prior to the *Paris Agreement* are insufficient to limit global temperature rise to 2 °C — at best, they will limit warming to 2.7 °C.[10] Following the election of Donald Trump as the 45th President of the United States, *there is a significant risk that the United States will withdraw from the Paris Agreement, or even the UNFCCC.* [11] There are growing suggestions that some form of geoengineering will be necessary to limit global temperature rise to 1.5 °*C.*[12]

The need to develop carbon dioxide removal (CDR) geoengineering or 'negative emissions' technology is arguably implicit in the 2015 *Paris Agreement*. [13] Shortly after the Paris Agreement was concluded, leading UK climate change scientist Kevin Anderson published an article in Nature, claiming that*:*

> *[R]ather than* requiring that nations reduce emissions in the short-to-medium term, the Paris agreement instead rests on the assumption that the world will successfully suck the carbon pollution it produces back from the atmosphere in the longer term.[14]

diplomacy-developing-united-nations>; John Vidal et al, 'World Leaders hail Paris climate deal as 'major leap for mankind'', *The Guardian*, 13 December 2016 < https://www.theguardian.com/environment/2015/dec/13/world-leaders-hail-paris-climate-deal>.

[8] *Paris Agreement*, opened for signature 12 December 2016 (entered into force 4 November 2016) < http://unfccc.int/paris_agreement/items/9485.php> art 2.

[9] See, eg, Agence France-Presse, 'Paris climate goal will be 'difficult if not impossible to hit'' *The Guardian*, 22 September 2016, < https://www.theguardian.com/environment/2016/sep/22/paris-climate-goal-will-de-difficult-if-not-impossible-to-hit>; Andrew King and Benjamin J Hanley, 'We have almost certainly blown the 1.5-degree global warming target', *The Conversation*, 15 August 2016, <https://theconversation.com/we-have-almost-certainly-blown-the-1-5-degree-global-warming-target-63720>.

[10] Simon Evans, 'UN report: Climate pledges fall short of cheapest route to 2C limit' CarbonBrief, 30 October 2015 <https://www.carbonbrief.org/un-report-climate-pledges-fall-short-of-cheapest-route-to-2c-limit>.

[11] See, eg, Coral Davenport, 'Donald Trump Could Put Climate Change on Course for 'Danger Zone'', *New York Times* (10 November 2016) <http://www.nytimes.com/2016/11/11/us/politics/donald-trump-climate-change.html>; John Vidal, ''There's no plan B': climate change scientists fear consequences of Trump victory', *The Guardian* (13 November 2016) https://www.theguardian.com/environment/2016/nov/12/climate-change-marrakech-no-plan-b--trump-victory; Coral Davenport, 'Diplomats Confront New Threat to Paris Climate Pact: Donald Trump', *New York Times*, 18 November 2016, < http://www.nytimes.com/2016/11/19/us/politics/trump-climate-change.html?_r=0>; Luke Kemp, 'President Trump could kill the Paris Agreement – but climate action will survive', *The Conversation*, 11 November 2016 < https://theconversation.com/president-trump-could-kill-the-paris-agreement-but-climate-action-will-survive-68596>; Valerie Volcovivi and Alister Doyle, 'Trump looking at fast ways to quit global climate deal: source', *Reuters*, 14 November 2016 < http://www.reuters.com/article/us-usa-election-climatechange-accord-idUSKBN1370JX>.

[12] See Robin McKie, 'Scientists warn world will miss key climate target', *The Guardian*, 7 August 2016 < https://www.theguardian.com/science/2016/aug/06/global-warming-target-miss-scientists-warn>.

[13] *Paris Agreement*, opened for signature 12 December 2016 (entered into force 4 November 2016) < http://unfccc.int/paris_agreement/items/9485.php> art 4.

[14] Kevin Anderson, 'Talks in the city of light generate more heat' 582 (7583) *Nature* 437, 437.

In other words, the Paris Agreement was concluded on the basis of the assumption that CDR geoengineering will be successfully developed and used in the coming decades.[15] However, it is questionable whether CDR geoengineering could be feasibly developed and deployed on a large enough scale to avoid global temperature increase exceeding 1.5°C.[16] Several scientists propose that SRM may be necessary to achieve this target, and there are calls for the IPCC to start factoring SRM into its modelling and scenarios.[17] There is a growing chorus of proponents who advocate that, while rapid global decarbonisation is the preferred response to climate change, SRM/SAI must be researched and developed so that it is ready to play a role in reducing global temperatures if necessary.[18]

In light of these developments, it is likely that proposals to develop geoengineering technology will gain increasing momentum as a potential means to respond to climate change. The question of how geoengineering attempts should be governed at an international level must therefore rise in prominence. International law needs to develop quickly if it is to play a role in governing the development and potential future deployment of SAI. In particular, it must be developed to ensure that any future field testing or full-scale deployment of SAI will not exacerbate an already bad situation. International law has already developed speedily in response to the risks of marine geoengineering,[19] for example through the 2013 amendments to the *London*

[15] See also John Shepherd, 'What does the Paris Agreement mean for geoengineering?' on *The Royal Society* (17 Feb 2016) <http://blogs.royalsociety.org/in-verba/2016/02/17/what-does-the-paris-agreement-mean-for-geoengineering/>; Joshua B Horton, David W Keith and Matthias Honegger 'Implications of the Paris Agreement for Carbon Dioxide Removal and Solar Geoengineering' *Harvard Project on Climate Agreements* (July 2016) <http://belfercenter.ksg.harvard.edu/files/160700_horton-keith-honegger_vp2.pdf>.

[16] Andy Parker and Oliver Geden, 'No fudging on geoengineering', (2016) *Nature Geoscience – Advanced Online Publication* <http://www.nature.com/articles/ngeo2851.epdf?author_access_token=H_OWCpUIRzRjnbDCD7phRNRgN0jAjWel9jnR3ZoTv0MkaXvEd3zZcdmn9cYxtHS6fy7t2z-okX47A1QNqqe2rvcM4Ijc2vF1BP3rPpd1u8KxPtLUkOH7pCuwiREjG8mo>.

[17] Ibid. See also Joshua B Horton, David W Keith and Matthias Honegger 'Implications of the Paris Agreement for Carbon Dioxide Removal and Solar Geoengineering' *Harvard Project on Climate Agreements* (July 2016) <http://belfercenter.ksg.harvard.edu/files/160700_horton-keith-honegger_vp2.pdf>.

[18] See, eg, Matthew Watson, 'Time to stage trials of engineering the atmosphere to cool earth' New Scientist, 23 November 2016, < https://www.newscientist.com/article/2113880-time-to-stage-trials-of-engineering-the-atmosphere-to-cool-earth/>; Jane C S Long, Frank Loy and M. Granger Morgan, 'Start research on climate engineering' (2015) 518 *Nature* 29; David W. Keith and Douglas G. MacMartin, 'A temporary, moderate and responsive scenario for solar geoengineering' (2015) 5(3) *Nature Climate Change* 201; David Keith, *A Case for Climate Engineering* (The MIT Press, 2013); Douglas G. MacMynowski et al, 'Can we test geoengineering?' (2011) 4(12) *Energy & Environmental Science* 5044; John A Dykema et al, 'Stratospheric controlled perturbation experiment: a small-scale experiment to improve understanding of the risks of solar geoengineering' (2014) 372(2031) *Philosophical Transactions of the Royal Society of London A: Mathematical, Physical and Engineering Sciences* 1; Edward A Parson and David W Keith, 'End the Deadlock on Governance of Geoengineering Research' (2013) 339(6125) *Science* 1278, 1279.

[19] See Chapter 1.2.5.

Protocol.[20] The question is whether international law can be similarly developed in time to govern the risks of SAI? At the present time, there is no indication that states will negotiate a similar agreement regarding SAI in the near future.

The aim of this project has been to analyse how the no-harm rule, as an existing rule of customary international law, might encourage states to take action to prevent and/or minimise the risk of harm to other states and to the atmosphere if they wish to field test and/or deploy SAI in the future. In order to achieve this aim, this project posed the following research questions:

1. *What is the history, content and underlying purpose of the no-harm rule?*
2. *To what extent does the no-harm rule, as currently formulated, respond to potential environmental harm from proposed SAI geoengineering activities?*
3. *What changes to the no-harm rule might be required to enhance its capacity to respond to risks of transboundary harm and/or harm to the atmosphere should SAI be attempted in the future?*

This project uses two approaches to answer these questions. Doctrinal legal analysis establishes the content of the no-harm rule and how it would probably be interpreted to apply to future attempts at SAI. Interactional law theory analyses the capacity of the no-harm rule to influence the behaviour of states by exerting a sense of legal obligation that will encourage states to comply with the rule if they decide to attempt SAI in the future. By combining these approaches, this research contributes to geoengineering governance literature by presenting a multifaceted account of the role of the no-harm rule in international environmental governance. Not only does it offer a detailed account of the content of the no-harm rule, it also establishes the extent to which the no-harm rule is likely to 'matter' to the behaviour and decision-making of states.[21]

In answering question one, this thesis contributes to international law scholarship by providing a comprehensive, cutting-edge analysis of the development – and hence the current interpretation - of the no-harm rule. It analyses key sources to demonstrate how the no-harm

[20] *Resolution LP.4(8): On the Amendment to the London Protocol to Regulate the Placement of Matter for Ocean Fertilization and other Marine Geoengineering Activities, LC 35/15* (adopted 18 October 2013) <https://www.gov.uk/government/publications/ms-amendment-to-1996-london-protocol-to-regulate-marine-geoengineering> ('*Resolution LP.4(8)*').

[21] See Kal Raustiala and Anne-Marie Slaughter, 'International Law, International Relations and Compliance ' in Walter Carlsnaes, Thomas Risse and Beth Simmons (eds), *Handbook of International Relations* (Sage Publications, 2002) 538, 538. See also Chapter 2.4.

rule has evolved over time and how its content is best interpreted at the present time. Many of the sources considered in this analysis, such as the records of UN General Assembly meetings, and the written submissions of states to international courts and tribunals, are often overlooked by legal scholars when assessing the content of the no-harm rule. By analysing these sources, this project provides a unique picture of how states have understood their obligations under the no-harm rule and how these understandings have changed over time. This is also one of the first pieces of research to analyse the implications for the no-harm rule of the seminal judgment of the ICJ in the 2015 *Certain Activities* case.[22]

In answering question two, this project provides a new understanding of the potential of the no-harm rule to contribute to the governance of SAI, and international environmental governance more generally. The no-harm rule should not be relied upon as providing an adequate and comprehensive governance regime for risk of transboundary harm from SAI. Existing research indicates that it would be difficult to hold states responsible or liable for significant transboundary harm from SAI under the no-harm rule.[23] However, this work demonstrates that the no-harm rule as it currently stands has a *basic* capacity to contribute to the *ex ante* governance of risk of transboundary harm to the territory of other states from SAI. Given that there is currently no indication that states will negotiate a comprehensive international agreement for SAI in the near future, this basic capacity could therefore enable the no-harm rule to play an important role in geoengineering governance. For this reason, the potential of the no-harm rule to contribute to geoengineering governance should no longer be downplayed.[24]

However, this project demonstrates that the no-harm rule has a poor capacity to respond to risks of harm to the atmosphere *per se* from SAI. It is unclear how the no-harm rule applies to these risks, and the no-harm rule is less likely to promote a sense of legal obligation and compliance from states in this context. This project therefore recommends how the no-harm rule might be developed to bolster its capacity to respond to risks of harm to the atmosphere. These recommendations are: (1) the development of a widespread community of practice between state and non-state actors; (2) the creation of a set of criteria to help determine when

[22] *Certain Activities Carried Out by Nicaragua in the Boarder Area (Costa Rica v Nicaragua) & Construction of a Road in Costa Rica Along the San Juan River (Nicaragua v Costa Rica) (Judgment)* (International Court of Justice, General List No 150 & 152, 16 December 2015).
[23] See Barbara Saxler, Jule Siegfried and Alexander Proelss, 'International liability for transboundary damage arising from stratospheric aerosol injections' (2015) 7(1) *Law, Innovation and Technology* 112, 122-123; David Reichwein et al, 'State Responsibility for Environmental Harm from Climate Engineering' (2015) 5(2-4) *Climate law* 142.
[24] See Chapter 2.2

an activity poses a risk of significant harm; (3) the clarification of enforcement mechanisms; and (4) the clarification of procedural obligations. These recommendations are uniquely informed by Brunnée and Toope's theory of interactional international law and are targeted at bolstering the likelihood of compliance with the no-harm rule, as well as enhancing doctrinal clarity. They provide states, policymakers, civil society and legal scholars with a practical strategy to enhance the capacity of the no-harm rule to respond to risks of harm to the atmosphere from SAI, to match its capacity to respond to risks of transboundary harm.

In this respect, this project makes a fresh contribution to a broader issue in international law and governance scholarship: the protection of the atmosphere. The ILC has recently commenced a new project on this topic, emphasising that protection of the atmosphere as an issue of contemporary significance to international law scholarship and to the United Nations General Assembly.[25] The special rapporteur, Shinya Murase, has published three reports on this topic, including early recommendations for a set of draft guidelines on the obligation of states to protect the atmosphere.[26] Unlike the broad approach taken by the ILC, this research is tailored to the distinctive challenges raised by proposals to develop SAI and it recognises the important role of legal obligation through the lens of interactional law theory. This is not necessarily a *better* approach to the protection of the atmosphere than the ILC approach, but it does provide states, policy-makers, and international law and governance scholars with a fresh perspective from which they might reflect on the future development of international law for the protection of the atmosphere.

Analysis of the no-harm rule using interactional law theory is both original and innovative. Aside from the work of Brunnée and Toope, interactional law theory has not been widely considered or applied by international law or international relations scholars. The examples that Brunnée and Toope use in their seminal book *Legitimacy and Legality in International Law* were primarily aimed to develop interactional law theory and demonstrate how its elements contribute to a distinct sense of legal legitimacy and legal obligation that can lead to effective lawmaking.[27] In contrast, this project uses interactional law theory as a means to assess the capacity of an existing rule to generate a sense of legal obligation, and recommend

[25] See *Analytical Guide to the Work of the International Law Commission: Protection of the Atmosphere, International Law Commission* (18 November 2016) < http://legal.un.org/ilc/guide/8_8.shtml#mandate>
[26] Shinya Murase, 'Third report on the protection of the atmosphere', Protection of the Atmosphere, International Law Commission, 68th sess, UN Doc A/CN.4/692 (2 May-10 June and 4 July-12 August 2016), 20, draft guideline 3.
[27] Jutta Brunnée and Stephen J Toope, *Legitimacy and Legality in International Law: An Interactional Account* (Cambridge University Press 2010), 17.

how it might be developed to improve this capacity. This project therefore ‘tests’ the utility of interactional law theory as an approach for analysing the potential of rules of customary international law to encourage states to comply. It provides international law and international relations scholars with a distinctive example of how interactional law theory can be used to predict compliance with international law.

The initial focus of this project was the governance of SRM geoengineering, with customary international law and the no-harm rule providing one of many potential mechanisms to focus on. It quickly became apparent that a single chapter on customary international law would provide only a superficial understanding of the potential of the no-harm rule. Instead of being the primary focus of this research, therefore, the governance of SRM became a lens through which to examine and analyse the role of the no-harm rule in international environmental governance. This project has coincided with a wider reawakening of interest in and engagement with the no-harm rule among academics, the ILC and the ICJ. This reawakening of interest suggests that the no-harm rule has more to offer international environmental governance than has been recognised to date. The unique challenges posed by SRM demonstrate the continuing relevance of the no-harm rule and the urgency and importance of its refinement and further development.

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Appendices

APPENDIX 1

Kerryn Brent

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